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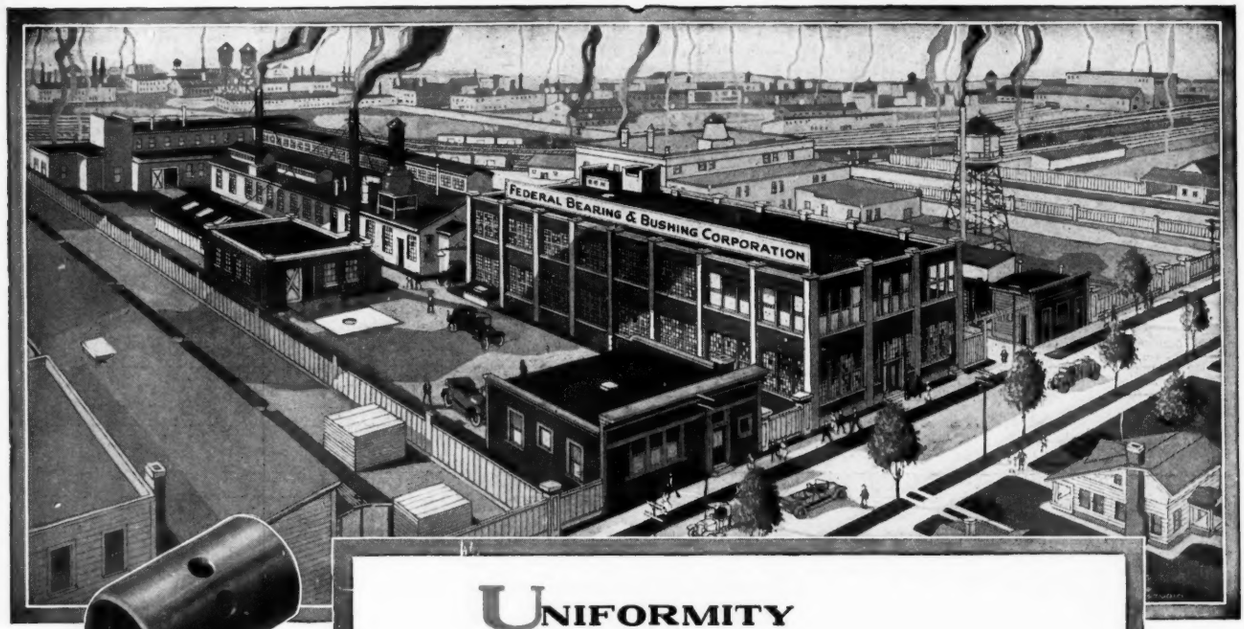

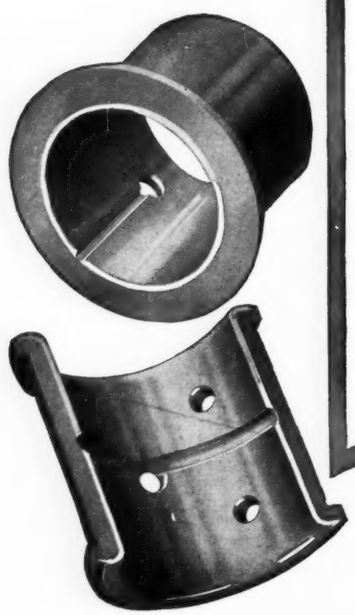

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VOL. XLIII NEW YORK—THURSDAY, AUGUST 5, 1920 No. 6

Export Trading in a Competitive Buyers' Market

What, in view of the financial situation in this and other countries, will be the course of our foreign automotive sales? This pertinent question is considered in the article herewith in which it is made plain that our manufacturers should seek heavier sales in the natural outlets of this country.

A RECASTING is in prospect during the next few months for much of the export trading of the American automotive manufacturers. Economic and industrial conditions in several countries, reflecting in part the financial situation in the United States, have become such that lessened takings of American made cars, particularly those commanding the higher prices, may be expected. This, then, would tend to throw much of our foreign output into other districts which have been less cultivated by our exporters and would result in building up our trade to those countries which should be our natural foreign outlets.

Several factors have been at work to bring about the present conditions. In the first instance, European factories are climbing slowly back into production, and in England, the country which has been the largest importer of American made cars, there is to-day no shortage of home built automobiles selling at £1,000 or higher. These are entering now into competition with the imported American cars and, of course, circumscribe the sale of the foreign built product. Furthermore, as the British dealers are finding it possible to obtain more and more cars, they are cutting down their inflated orders, which frequently were several times in excess of their actual requirements, and this also is reducing the active market demand.

England for many months—practically since the embargo was lifted last fall—has been the heaviest single purchaser of American made automobiles. That country has bought heavily and has attracted almost all of our makers. It is a fact that there is scarcely a maker in this country who has not shipped cars to England and opened some sort of sales agency. England, literally, has been flooded with the products of this country in the invasion of the American car manufacturer.

But, unfortunately, everything is not right with the markets in that country. The unrestrained and wild buying of the after-war period has slackened. Financial conditions have taken a turn similar to those of the last few months here at home. Trade depression has become acute. Of this, there are many evidences. One is the falling exchange, which daily has been dropping a few points for several weeks. Currency deflation is proceeding there, just as it is in America, and is finding its reflex in lessened demand and lighter buying. The value of British motor stocks has been declining as purchasing has decreased, and tire factories, finding themselves overstocked

from schedules made up for an inflated market, have reduced their working forces to correspond with the normal demand.

In England and other European countries, automobiles are sold largely as luxuries. The passenger car is still a pleasure car and, despite the great impetus the automobile received during the war, it is not regarded there as so much of an essential as it is in the United States. A recent letter from London states that there has been "a very marked and steady drop in British motor car prices," largely because of the feeling that the automobile is a luxury which can be dispensed with in times of economy. Another letter, likewise from London and indicating how the actual demand has been over-estimated in England, declares that:

"Trade depression over here is something staggering and it is anticipated that many of the concessionaires of high grade American cars will shortly close their doors. They apparently worked on the basis that the peak demand at the last Olympia Show was the normal and ordered accordingly, so that they have ordered shipments far in excess of normal requirements. It is understood here that there are over 300 cars on the London docks, yet I would not estimate the normal demand for a car of this type at more than 200 a year under present circumstances. The same general idea applies to other high priced American cars. One can buy a very good British car for £1,000 to-day and, therefore, American cars costing £200 or £300 more than this price have a correspondingly hard time of it."

Still, the shipments of American cars to the overseas markets continue without abatement. Month by month they have grown and thus far there has been no apparent let-up in the numbers that are being sent abroad. There should be no let-up and no dropping of value and volume of the foreign automotive trade of this country. What there should be and will be is a shifting of its direction, sending it into the natural outlets for American trading and developing that trade to the extent of its possibilities.

There are many such districts into which the American automobile and its attendant products should go. Of these, the chief is South America, Central America and the West Indies. Another is the Far East—China, Japan, Straits Settlements, the Philippine Islands. These are potential markets; they are absorbing to-day great quantities of American made automotive equipment. But far from the total that is warranted.

Europe is a manufacturing country and foreign products there must compete with those manufactured at home. Lower priced cars, trucks and tractors made on production methods in America can absorb the heavy ocean freights and the customs duties and still be sold cheaper than the products made at home. Higher priced cars cannot do so with such success; no more can numerous accessory and equipment products and many of the tires.

Latin America has no automotive manufacturing of its own, except perhaps for a few body building shops. It has no preferential tariffs and the American car, in regard to ocean freights and costs of delivery, are on a par and frequently much better off than are the products of the Europeans. As near to the United States as they are to Europe, or nearer, these should be the countries to be "invaded" by the makers of this country. Once gained, these fields will never be lost.

This entails much on the part of the manufacturer who will take up selling there. The markets are largely potential rather than actual. They must be developed and mistakes made in the past must be overcome. These countries do not make a great outcry for cars, as did the Europeans, and, of course, the markets will have to be built up. But the field will be a permanent one which will grow from year to year.

International markets, since the war threw them into confusion, have been supplied abnormally. The United States, as the only manufacturing nation which could ship abroad its goods in quantities, perforce took all of these markets without having to overcome any sales difficulties. The business was there; it had to be supplied, and no one else could supply it. Consequently, it was seldom necessary to build up sales organizations, to work out merchandising policies and to sell in competition with others. Buyers held out their money and production was never sufficiently high to meet the demand. Goods were not sold; they were merely turned over, and the seller might exact his own conditions.

MANY automotive manufacturers in their recent export sales have done nothing more than to cater to present unusual demands. Others have adopted broad merchandising policies, alloting certain percentages of their production to the foreign field, and then have worked skilfully and intelligently in broadening their sales possibilities. The mushroom demands of the post-armistice period are threatening to change, as international trading comes closer to normal, and foreign selling will turn into a buyers' market.

But the world is slowly winning its way back to normal. It has not achieved that desired pedestal, but it is approaching it. International buying, likewise, is approaching the normal and the "wild cat selling" of the war and post-armistice days is passing. Foreign trade will be gained and won on the merits of the product, the merits of the seller and, above all, by the manner in which he gives satisfaction to the buyer. That marks the turn from a sellers' to a buyers' market — and the exporter must guide himself accordingly in the future.

The shifting and recasting of the automotive exporting will be along these lines. This will not come with a rush, but rather will be gradual and the measure of the exporter's success will be a criterion of the merchandising policies of those companies participating in it.

Foreign trading is a difficult undertaking in a buyers' market. It requires care, thought and intelligence. It necessitates a merchandising policy that eliminates the haphazard and the casual. The firm not equipped for foreign business will find itself out of pocket and nursing the pains of a wounded pocketbook. The outlaw and blue sky foreign trader, of whom many have sprung up in recent years and months, will fold up his tents and steal away, not perhaps silently but more probably with the noise and explosion that follows failure. The firm that rides through the breakers will be the one that has maintained an intelligent sales policy and acted with even more skill and care than has marked its business at home.

Further than this, it will be the company which supplies service for its products, be they cars, storage batteries, tires, trucks or tractors. The car which is sold without service facilities somewhere at hand is a drawback rather than an asset. The manufacturer alone may properly provide this service. By permitting their products to be sold into the foreign markets, they obligate

themselves to such a task. And they must remember that export traders have broadcasted their cars and other products throughout the world. The manufacturer, if he intends to continue in business, must take these cars and these products under his wing so far as service is concerned, but, unfortunately, many companies have not awakened to this need. They cannot rely upon some other party or concern to attempt a makeshift service; they must take it upon themselves and see that it is provided.

Numerous automotive firms in this country have built up successful and profitable sales in all of the markets of the world. Those firms will continue to do business, in England, Europe, Latin America, the Far East, Australia, South Africa. They have followed the same time-tried principles of trading that have guided the pioneer foreign traders of other industries. They have built firm foundations and upon them are rearing their business structures. Once such a firm went into a foreign market—which was done only after much thought as to the company's own production abilities and the worth of their products—it went in to stay. It did not pop in and out, attempting to use these markets merely for the purpose of getting rid of an occasional excess of production. These firms went in to stick, absorbing such incidental losses in the belief that the business would finally justify their choice. It was costly and slow, but profitable in the end.

It is careful attention to detail, from the preparation of the first letter to the final servicing of the car, that builds up foreign business. There have been many mistakes and many faults to correct. But with the idea in mind that they would stay in these markets, these eminently successful firms have built up their trading to its present high volume.

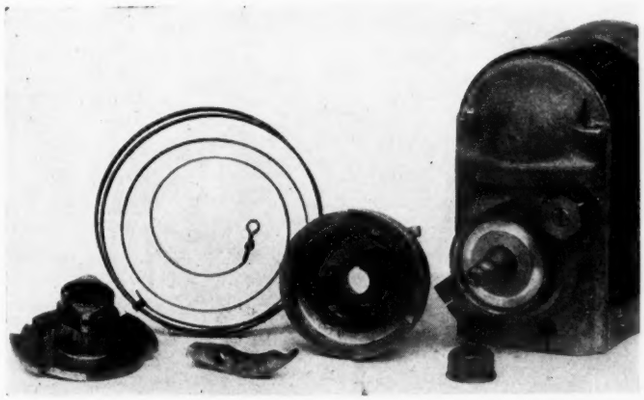
In export selling, it is more often the overhead than the product itself that brings about the failures. The overhead for such business is high. Also, it is complex. Pitfalls and exacting demands are to be met in putting the goods into the customer's hands and keeping him satisfied. The firms which have gotten temporarily into the export business will fall down when it comes to this overhead. Their product may be the best in the world, but unless they can combine the worth of their product with skill and ability in their merchandising methods they are doomed to failure.

In conclusion, it may be said that certain automotive markets should belong naturally to the manufacturers of the United States. A great start already has been made in gaining and holding them. The future alone will determine whether or not these markets are to remain as predominantly American as they now are. And this, it is apparent, is not talking about to-day or to-morrow, but of 1921, 1922, and farther along in the coming years.

A British Impulse Starter

THE British M-L Magneto Co. has put on the market an impulse starter of meritorious design. It is a separate attachment which can be fitted to existing and standard M-L magnetos without alteration, and to many other makes of machines with only a slight variation in one part. It is automatic in action and simple in construction.

Normally the starter forms the driven member of a flexible disk coupling in the magneto drive, and lenthens the latter ¾ in. Attached by a split end and pinch bolt to the boss of the magneto end plate is a bracket carrying an octagonal stop of hardened steel. The two other main parts consist of (1) an outer casing of gun-metal attached by taper, key and lock nut to the driving end of the armature shaft and (2) a steel end plate having a sleeve extension with two integral cams projecting into the casing. Pivoted on hardened steel pins within the casing and with their outer ends projecting from it, are two rockers or pawls which, when the crankshaft is rotated for starting, engage successively with the bracket stop.



The M-L impulse starter dismantled. Left and right: End plate and cam unit, coil spring, one of the pawls, casing with other pawl in position, bracket with stop attached to end of magneto

Conveying the drive from the end plate to the casing secured to the armature is a flat section coil spring which is given five turns during assembly. When one of the pawls engages with the bracket stop, the casing is held against the pressure of this spring until, owing to the end plate and cam unit continuing to revolve, one of the cams lifts the inner end of the pawl in use and releases the outer end from the stop. Thereupon, as usual in impulse starters, the armature is flicked forward, its independent travel in this direction being limited by dovetailing between the end plate and the adjacent facing of the casing, this dovetailing allowing of considerable latitude for relative movement when the casing is temporarily held as mentioned.

When the engine starts, and all the while it is running at any speed over 120 r.p.m., the pawls are held clear of the stop by reason of their inner ends, being the heavier, flying outward against the interior of the casing and being held there by centrifugal force.

The coil spring is of liberal dimensions in view of its work in conveying the normal drive, and there is no likelihood of the timing of the ignition being affected by unintentioned lag. In the unlikely event of its breaking, the set screw which holds the octagonal stop to the bracket can be removed from its normal position and screwed into a tappet hole in the casing, its tip then passing into a groove cut in the outer periphery of the end plate; thus the whole device can be temporarily locked solid until a new spring is obtained and fitted.

The only adjustment is the locating of the stop bracket on the magneto end plate, which allows the timing of ignition for starting to be varied within limits. Lubrication is maintained by a few drops of oil occasionally introduced through the pawl slots to the interior of the casing, the cams having holes drilled through them with wicks inserted to convey the lubricant to the pilot bearing of the end plate and cam unit; this bearing is formed by a boss extending inward from the magneto end of the casing.

High-Speed Light Engine Has Quick Take-Down Feature

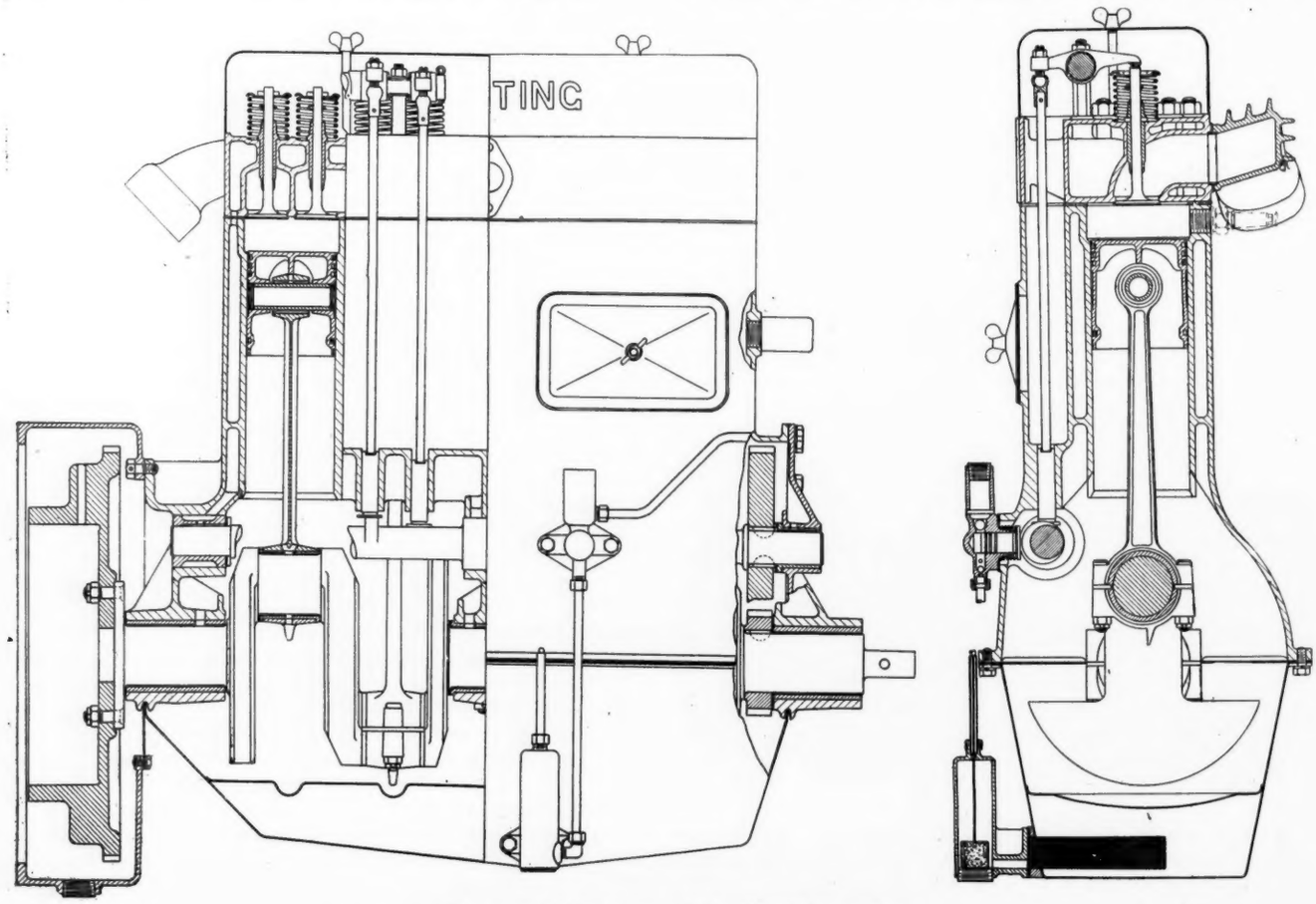
This new engine has only four sizes of nuts in the entire design and can be taken down and reassembled by two men in less than two hours. The cylinders and the upper half of the crankcase are a unit. With slight changes it can be used for small trucks and light tractors.

A LIGHT engine of four-cylinder overhead valve design is being produced by the recently organized Oberting Motors Co. While it is mainly intended for passenger cars, it may be used also on small trucks and light tractors, a different camshaft being fitted in the latter case, which gives a timing more suitable for low speed, hard pull work. An advantage claimed is that it can be taken down and rebuilt by two men in less than two hours. Only four sizes of nuts are used in the entire design. Another feature is the intake manifold, which is designed with a view to entirely breaking up and vaporizing the fuel at the point of entering the combustion chamber. The manifold, being cast in the head, does not require any hot spot or other heating arrangements on the outside.

It is a four-cylinder block cast engine, 3½ x 5½ in., weighing 475 lb., and delivers 52-53 hp. at 2400 r.p.m.

The cylinder block and upper half of the crankcase are cast integral, while the oil pan and splash troughs, or lower half, is a steel stamping, and is so arranged that the whole unit can be removed in less than ten minutes, exposing all main and crank bearings. The cylinders are counterbored at the top to allow for free valve openings, and the entire compression space is machined to insure an equal volume and equal compression in all cylinders. The head is detachable and held in place by ten ½ in. heat treated studs.

The valves, which are interchangeable, are 1¾ in. in diameter and are located in line in the head. The exhaust valve opens 50 deg. early and closes 10 deg. late. The intake opens 15 deg. late and closes 45 deg. late. The valves are operated by push rods and rocker arms from the camshaft, which is located at the right side of the engine. The camshaft is 1¼ in. in diameter, with



Front and side views of the Oberting engine

three bearings, the front 1¼ x 1¼ in., the center 2 x 1¼ in. telescoping and the rear 1⅛ in. Bronze bushings are used at front and rear. The push rods are tubular, with ball and socket joints at the ends. They are enclosed in the cylinder block, and face plates held on by wing nuts are provided for inspection. The rocker arms are carried on a 1 in. shaft, being lubricated by a flat wick held to the shaft by spring clips. They are further oiled by oil vapor thrown up through large openings between the valve tappets, which also act as breathers in place of the usual breather pipes. The valve rockers, push rods and valve tappets are interchangeable. The whole valve gear is enclosed by an aluminum stamping held on to the head by two studs with wing nuts. This arrangement keeps in the oil and prevents dust and dirt from creeping in.

The pistons are of either Lynite or grey iron, as desired. They are 4 in. long, with four rings, three above the piston pin and one on the skirt.

The connecting rods are drop forged, semi-finished, of "I" section, with scuppers on the caps. There is one oil hole over the top half of the bearing. The bearings are babbitt-lined, bronze-backed, 2¼ x 2½ in. and held on by a two-bolt cap with laminated shims. The piston pin bearings are bronze bushed, the bushing being pressed in the connecting rod, with a large hole on top for lubrication.

The crankshaft is of the counterbalanced type, of 40 point carbon steel, 2¼ in. in diameter, heat treated and ground, and is supported in three reinforced babbitt bearings, 3½ x 2¼ in. front, 2½ x 2¼ in. center, and 4 x 2¼ in. rear.

The flywheel is 16 in. in diameter, cast iron, semi-finished and machined for a single plate disk clutch; it is secured to an integral flange on the crankshaft by means of six heat treated 1/16 in. steel bolts.

Lubrication is by force feed and splash system, oil being collected by scuppers on the ends of the connecting rods from individual oil troughs in the lower half of the crankcase.

The oil is kept at a constant level in these individual troughs by a plunger pump driven directly from an eccentric on the camshaft, oil being carried to the timing gears and thence back to the splash troughs, the three main bearings and the three camshaft bearings, all of which are supplied with extra large oil pockets to keep all main and camshaft bearings well flooded with oil. The lubricant is pumped from a five-quart sub-basin beneath the splash troughs through a fine mesh strainer. A float chamber is bolted to the side of the oil basin, with a cork float and a small rod running up the side of the crankcase showing the oil level in the sub-basin.

A starting motor flange is provided on the aluminum S. A. E. standard No. 3 bell housing. Provision is made also for ignition. A plain lighting generator, a magneto or both can be mounted on a detachable magneto or generator bracket, and driven through a standard two-bearing magneto shaft and coupling.

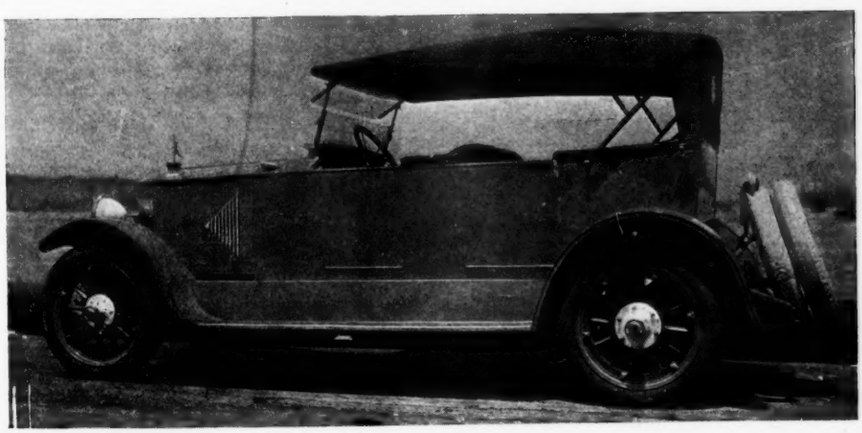
The engine is designed for a 1-in. carbureter on a standard flange. Cooling is by thermo-siphon circulation with extra large inlet and outlet passages, allowing a free circulation of water around the cylinder walls, combustion chambers and valve stem guides. The fan is driven by a flat 1-in. face pulley on the front end of the magneto shaft. It is supported by a bell crank and pinch bolt adjustment on a stud in front of cylinder block.

The timing gears are of the helical type, 1 in. face, 8 pitch and located at the front end of the crankcase. The crankshaft gear is steel, not hardened, while the camshaft gear is optional, either bakelite or cast iron, the third, or magneto gear, being cast iron.

A Car for Shipment to Greece

THE little country of Greece, greatly enlarged and its material position improved through the results of the World War, is considered such an excellent outlet for American made automobiles that Demos Tsaconas has undertaken at New York the assembly and manufacture of a car solely for export to that country. Shipments of the first cars were made late in June and more are to follow as quickly as they can be purchased.

The car was designed by A. Lucand, a member of the Society of Automotive Engineers, who attempted to meet the Greek demands for a trustworthy car highly finished and equipped. The car has been named the Hermes, the old Greek god of speed, and carries a radiator cap having a diminutive statue of that ancient character. Specifications of the machine are as follows: Buda engine, 3¾ x 5⅛ in., thermo-siphon cooling, Bosch magneto, Westinghouse starting and lighting, Zenith crankshaft, Thermoid universal joints, and Hotchkiss drive. The car has a wheelbase of 125 in. and a tread of 58 in. The two models, of five and seven passenger touring, are in blue with white stripes. Of especial interest is the lighting provided, thirteen lamps in all being used. There are two double lamps in front, two side lamps, two engine lights, two dash lights, two back seat lights and one back light.



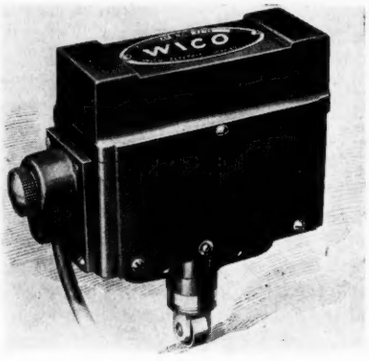
The Hermes, designed for export shipment to Greece

ACCORDING to an article in *La Technique Moderne*, certain steel makers have considerably improved the quality of their spring steels by the addition of tungsten in small proportion, not exceeding 1 per cent.

Two Types of Magneto That Employ the Magnetic Bridge Principle

These magnetos are remarkable for the fact that they do not employ a rotating armature. One type has a reciprocating armature and in the other the armature is on the periphery of the flywheel. These features insure a heavy spark at low engine speeds and permit of a large air gap.

TWO new types of high tension magneto, both characterized by the fact that they are without the usual rotary armature, have been placed on the market by the Wico Electric Co. The magnets are made from flat bars and the coils are wound on stationary cores that project at right angles to the magnets at each end. The magnetic circuits through the coils is completed by an armature movable with relation to the outer ends of the cores. Both designs are based on the magnetic bridge principle; that is, a path of relatively high magnetic reluctance bridges the cores at their junction with the poles of the magnet. The bridge thus parallels the magnetic circuit through the coils, but when the armature is in contact with the cores, the bridge diverts relatively little flux therefrom, because the reluctance of the cores and armature is much less than the bridge reluctance. When, however, the armature is suddenly withdrawn, and a large air gap is thus made in the magnetic circuit through the coils, the bridge carries enough flux from one pole of the magnet to the other to prevent demagnetization.



Type AX magneto

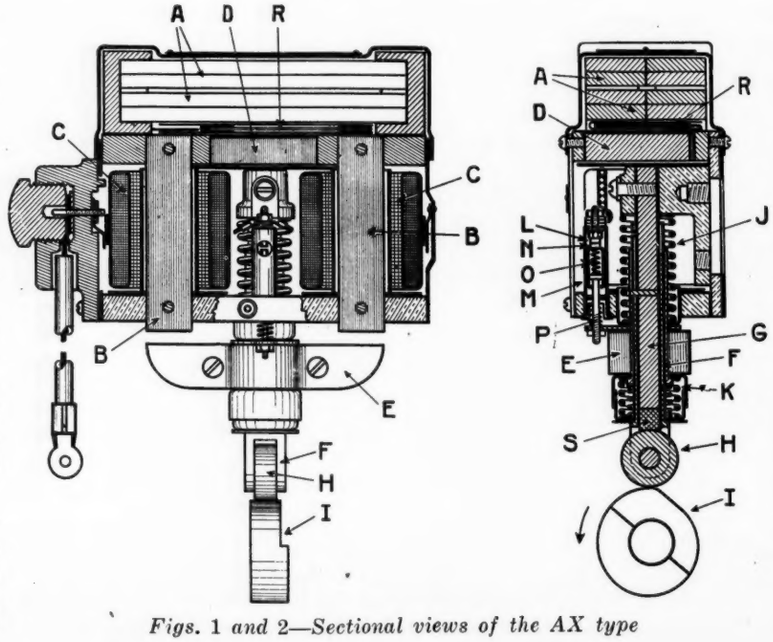
The application of the magnetic bridge principle permits the use of a large air gap (7/64 in. when the breaker points open) to give a maximum change influx, a practice that otherwise would result in the rapid weakening of the magnets.

Of the two new designs, Type *AX* is provided with a reciprocating armature and is designed for engines of any size, operating at speeds up to 1200 r.p.m. for 4 cycle and 600 r.p.m. for 2 cycle engines. Type *FW* is a flywheel magneto for 2 cycle or 4 cycle engines operating at speeds up to 1200 r.p.m.

With Type *AX* magneto the length and intensity of the spark is independent of engine speed, and thus the full capacity of the magneto is available for starting. The coils are wound, insulated and impregnated as units before assembly. The impregnation treatment fills the interstices of the winding with a compound that hardens when baked and makes the coil a solid mass.

The movable contact of the interrupter reciprocates in a tubular guide to insure alignment with the stationary contact. It is stated that wear of the contacts up to 1/32 inch does not materially affect the spark. It follows that the adjustment, when required, is not a matter of extreme delicacy. The mica condenser is mounted in a protected position. The machine is inclosed in a brass case, the top of which is a deep drawn hood, and the sides of which are made in four sections to facilitate removal and inspection.

The principal parts of Type *AX* and their relation to one another are shown in Figs. 1 and 2. Fig. 1 is a sectional side elevation with breaker points open and armature away from cores. Fig. 2 is a sectional and elevation with breaker points closed and armature in contact with cores. A magnet *A* made up of 8 flat cars spans the ends of two parallel cores *BB*, on each of which is a coil *C* with a primary and a secondary winding. Beneath the magnet a pack of steel laminations *D* extends from core to core. This is the magnetic bridge previously mentioned. The other ends of the cores are ground flat to receive an armature *E* that is alternately moved into and out of contact with the cores to establish and disrupt the flux through the coils.



Figs. 1 and 2—Sectional views of the AX type

The movement of the armature is accomplished as follows: All moving parts are supported on guide rod *G*, which is fastened at its upper end to the magneto frame and projects downward parallel to the cores. Sleeve *F* (called the cam follower) slides on rod *G*

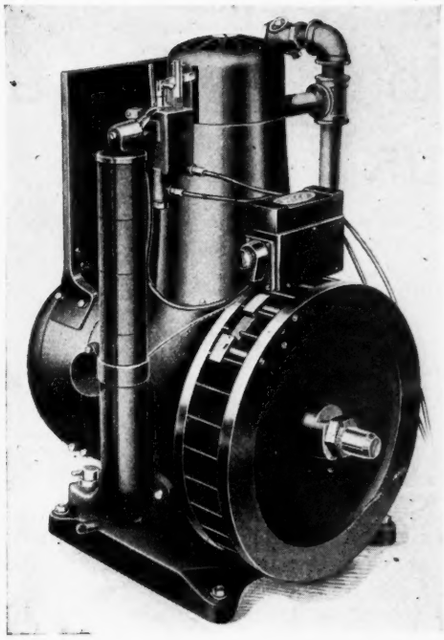


Fig. 3—The FW type in position

and carries roller *H* that bears on cam *I* on the engine shaft. The armature is slidably mounted on the cam follower between two compression springs *J K* that bear on the magneto frame above and on the shoulder of the cam follower below. As the cam revolves the follower is raised and the springs are compressed until the armature is forced against the cores where it is held by magnetic attraction and by the pressure of the lower spring until a sudden change of the contour of the cam allows the follower to descend and release the pressure of the lower spring. The upper spring then drives the armature away from the cores. The downward movement of the armature is very rapid because it is held against the cores by magnetic attraction until the upward pressure of the lower spring is reduced to zero, and thus when the armature starts, there is practically no resistance to its movement except its own inertia.

The method of driving the cam is such that the descent of the cam follower is uniform at all engine speeds. The cam is not fastened to its shaft, but is driven by a shoulder on a collar secured to the shaft which engages a shoulder projecting from the cam. When the cam follower roller bears on the flat of the cam, the pressure of the springs forces the cam ahead of its driving shoulder and the cam follower is shot down instantly to its lowest position, where it is quietly arrested by spring *K*.

The breaker point mechanism is reciprocating in form and consists of an insulated stationary contact *L* mounted at the top of the vertical tube *M* which serves as a guide for the grounded contact *N* that moves up and down with the armature. Between the movable contact and rod *P*, which connects it to the armature, there is a spring *O* which allows the contacts to meet gently and keeps them closed under pressure until the armature has moved a predetermined distance from the cores, when the contacts are very sharply opened. The condenser *R* is mounted in the space between the magnet and the magnetic bridge.

Lubrication of the guide rod, cam follower and armature is accomplished by a plug *S* of woven felt, placed at the bottom of the cam follower tube, where it bears on the roller and becomes saturated with oil from the cam. The reciprocating movement of the cam follower and armature distributes the coil to all rubbing surfaces.

Type FW Magneto

Type *FW* magneto has all the characteristics of Type *AX* and is identical in construction, with the exception of the armature and the breaker point mechanism. The armature is made of steel laminations and is fastened to the engine flywheel at or near its periphery so that the velocity of the armature is very high, even at cranking speeds. The magneto is mounted on a bracket fastened to the engine frame so that the ends of the cores overhang the path of the armature. The two cap screws that secure the magneto to the bracket pass through slots in the magneto frame, to permit radial adjustment of the machine for placing the cores in proximity to the armature. This is accomplished by placing sheets of paper on the armature and allowing the faces of the cores to rest on the paper while tightening the cap screws.

The breaker points are mounted separately from the magneto at the point most convenient for driving from the main or half time shafts. The mechanism consists of two arms, *A* and *B*, pivoted on the same pin *C* and connected by a tension spring *D*. Contact arm *A* carries the movable contact which functions with the fixed contact *E*. The knockout arm *B* acts as a hammer to open the contacts at the proper time. The movement of these arms is controlled by two cams on shaft *F*. The spring that connects the arms presses them against the cam in which two notches are cut. One notch controls the contact arm and allows it to drop and close the contact when the armature has moved under the cores. The other notch allows the knockout arm to snap against the contact arm and open the contacts as the armature leaves the cores. The duration of the contact is fixed by the spacing of the notches and the

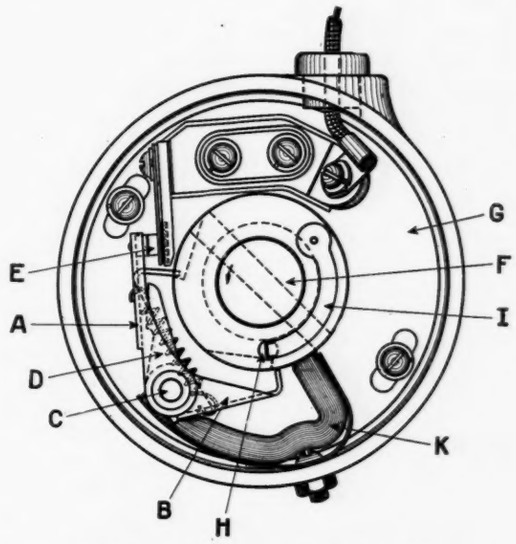


Fig. 4—Breaker points for type FW

time of the opening is controlled by moving plate *G* on which the arms are mounted. Wear of the contacts does not change the timing.

Dog *H*, controlled by spring *I*, constitutes a ratchet for driving the cams forward and preventing their turning and wrecking the arms if the engine runs backward. Felt pad *K* provides lubrication for the cam surfaces and for the pivot on which the arms rock.

F. W. WILE, correspondent for *Philadelphia Public Ledger*, states that during the fiscal year ending March 31, 1921, Japan will expend more than $300,000,000 on naval and military expansion.

English Design and Operation of the Motor Bus

Part I

This article is the first of series by Mr. Bourdon describing motor buses in England. This takes up the restrictions and conditions that apply both to structure and to service, showing particularly some of the factors that regulate operation. Further articles will follow in coming issues.

By M. W. Bourdon*

THERE can be no question that London has been the cradle and nursery of the motor omnibus and that in the metropolis of England its development has been the subject of more careful, close and prolonged study than in any other part of the world. Design has been affected by such factors as operating costs, the safety and convenience of the traveling public, the requirements of the licensing authorities, and also the somewhat peculiar conditions imposed by London service. Although developments have been marked and continuous until quite a satisfactory type of vehicle is now being produced, it cannot be said that all requirements have been met or that anything approaching finality has been reached.

The latest design to be put into use in London is known as the "K" type and seats 46 passengers (22 inside and 24 outside) as compared with the 34 passengers (16 in and 18 out) of the former "B" type. But even now, before 100 out of 500 "K" type buses on order have been delivered, the first experimental vehicle of a still further improved model —seating 56 passengers—is about to be put under private test. Design of both chassis and body, but particularly the latter, is still in a "liquid" state, a fact which applies to the motor buses used outside the London area as much as to those licensed to run in the metropolis.

Provincial double deck bus on Leyland chassis, seating 34 persons, 16 on the inside and 18 outside

While the motor omnibus is so closely associated with London, its use is by no means confined thereto. Even before the war, services both privately and municipally owned were being started in various towns and cities throughout the Kingdom, but since the beginning of last year the provincial services have been extended and multiplied beyond all expectation. Bus routes are covering the country as a network. In rural districts, on by-roads and on main highways, the motor bus is frequently met in every one of the counties of England and in many of those of Wales and Scotland. While there are no official records available showing the number of these provincial lines, it is safe to say that, despite the large number in use in London—over 2500—there is a considerably greater number operating outside the metropolitan area.

These provincial buses are, however, by no means counterparts of those used in London and, in reviewing recent developments in the design of British motor bus chassis and bodywork, one must take into consideration the differences in the regulations applying to vehicles which run in London and those used in the towns, cities and country districts. Design is appreciably affected by the regulations, as will be shown later.

Roughly, the metropolitan area extends for 20 miles or so from the "official center" of London, i.e. Charing Cross, and within this district the Metropolitan Police authorities are supreme in all matters relating to the licensing of public service vehicles of all kinds. Outside the somewhat irregularly shaped metropolitan boundary — which, incidentally, contains the "one square mile" of the City of London with its special police, who delegate their vehicle licensing powers to the Metropolitan Police— innumerable licensing authorities exist. But with few exceptions the latter have no special regulations concerning bus chassis and bus body design and licenses are issued freely, so long as the authorities have no objection to motor buses running in or through the districts under their control. In the metropolitan area, however, the police have definite and special rules and regulations, so drastic and so rigidly enforced that they have considerable and almost direct effect upon design.

It may be said, therefore, that in Great Britain there are two types of motor buses, i.e. those running in the metropolitan area and those outside of it. At times there are no buses worth mention running in London other than those made by the Associated Equipment Co.—a concern subsidiary to the London General Omnibus Co., formed

Mr. Bourdon is engineering correspondent of AUTOMOTIVE INDUSTRIES *in the United Kingdom.*

Single deck bus with 32 seats, three of them being in front beside the driver

primarily to undertake manufacture for the latter—and the pre-war Tilling Stevens gasoline-electrics. Even the latter, while they are becoming more widely used in the provinces, probably will disappear from the London streets in course of time for, since the present maximum weight standard was imposed, no new buses of this make have been licensed. Until the early part of this year there was also a service of steam buses but these have now been withdrawn from London, although a number of the units are now running in the provinces. Incidentally, it may be mentioned that at the moment of writing the London County Council, the elected municipal authority for the whole of the metropolitan area, is endeavoring to obtain the sanction of Parliament to run motor buses itself, having in view an investment of $2,000,000.

Buses in the Provinces

The buses used in the provinces are the products of a number of makers, mainly firms who are essentially truck manufacturers and whose standard 3 to 4-ton truck chassis with certain modifications are adapted for passenger bodies of one type or another. These vehicles fail in many fundamental features to qualify for licenses to run in London, but for provincial work they are very little the worse for that, when the requirements of that class of use are considered. The only regulations with which they must comply are those issued by the Government department concerned with the use of motor vehicles generally. They are subject, then, only to regulations issued by authority of the Act of Parliament and contained within the "Heavy Motor Car Order," certain clauses of which apply equally to trucks and buses. The London buses also come under the same order but must comply, in addition, with the special regulations of the Metropolitan Police.

Truck makers generally do not now attempt, as they did at one time, to make bus chassis suitable for London use. They would have no market for them even if they did. And as complying with the London police regulations increases the cost of the chassis—or, at any rate, necessitates a special design—there is no advantage to be gained by including these special features in vehicles intended for the provincial market; there is no call for them. From what source the London County Council will obtain their buses, if or when Parliamentary sanction is given to run them, is at present a matter for surmise.

But although the Associated Equipment Co. now has matters all its own way in making buses for the metropolitan area, it does not confine its activities to London. It is a direct competitor of the truck makers who supply bus chassis for provincial use, although the chassis it sells in the provinces is of a different type from those it makes for the L. G. O. C. Like the truck makers' product, it is practically a truck chassis and, in modified form, is sold to brewers, millers, and other industrial concerns.

The London bus chassis being, therefore, a specially made article, and the provincial one very little more than a modified truck chassis, the two must be considered separately.

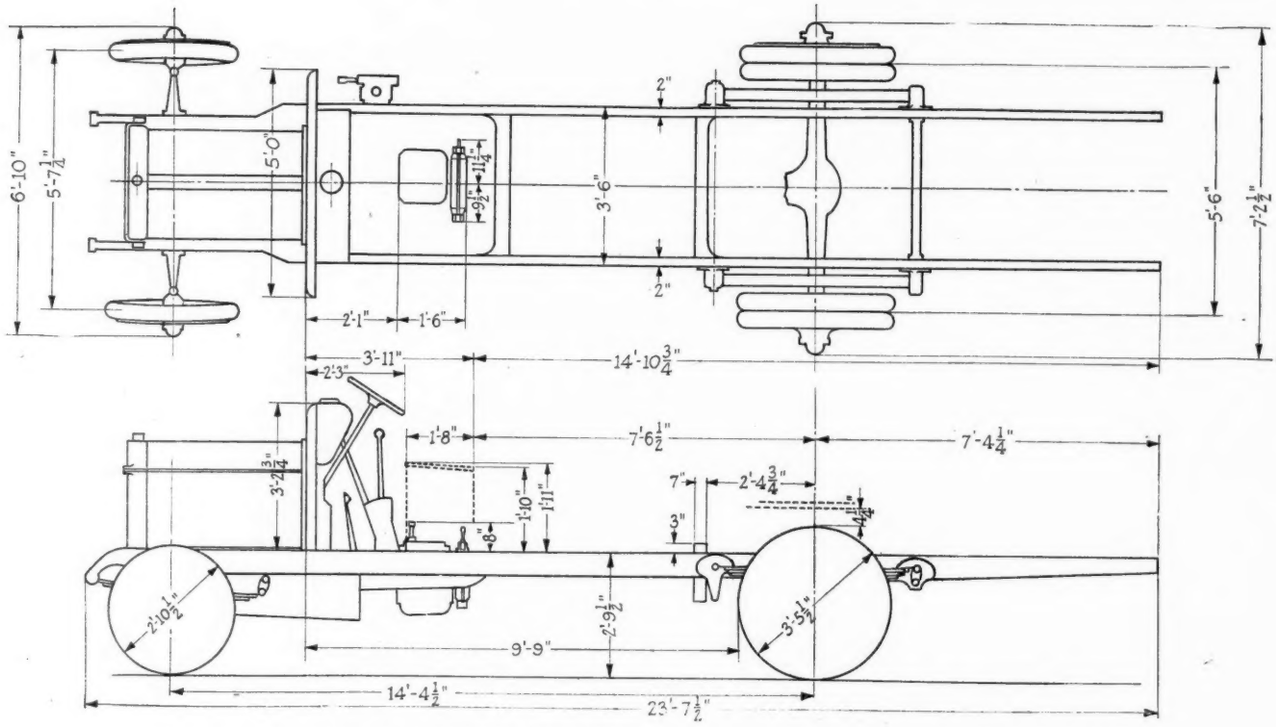
The London licensing authorities have not framed their rules arbitrarily or without good reason and, speaking generally, they have the concurrence of the operating companies. Many of the requirements caused by the traffic congestion and narrow streets of the metropolitan area may not apply with equal force in the wider and better arranged thoroughfares of American cities, but where the London rules affect stability, quietness of running, cleanliness—freedom from oil drippings—smokelessness, maneuverability, braking, vibration, etc., they may possibly, it would seem, be adopted in similar form in the United States when this type of public conveyance increases and multiplies at the expense of the trolley car.

But even the London regulations are not standardized; they are varied and "tightened" from time to time, the licensing authorities believing—not without some reason—that by this means they can force the development of design of chassis and body upon makers and operating companies, preventing them from "getting into a groove," or becoming complacent and satisfied with existing standards of excellence. The variations are mainly concerned with the reduction of weight and vibration and with other qualities affecting the preservation of the road surfaces and property adjacent to the routes followed, the licensing authorities in turn being egged on to demand more consideration in these directions by complaints—justified and unjustified—from individuals and public bodies.

The Weight Question

In regard to the question of weight, the following maxima must not be exceeded in London, unless the authorities exercise their right to make variations in special cases: Complete vehicle, unladen, 7840 lb.; or, if the makers prefer, back axle weight laden, 8960 lb.; front axle, laden, 4480 lb. In no event must the total laden weight exceed 13,440 lb., the driver, conductor and passengers being taken as weighing 140 lb. each.

Certain requirements as to the main dimensions of chassis may be mentioned here, as follows: The total length of the chassis must not exceed 20 ft., unless the



Overall dimensions of Thornycroft bus chassis for double deck and large single deck vehicles

rear platform is supported by the frame; in the latter event the total length may be 23 ft. The ground clearance must not be less than 10 in. The rear springs must be at least 45 in. apart and the front springs 38 in.—this is obviously to limit side sway. Wheelbase maximum, 174 in.; track, which must be the same for both back and front wheels, center to center, minimum 66 in.; extreme width, 86 in.

The design and construction of the body are also subject to precise and stringent rules and tests. Seat and gangway widths, staircase and handrail design and dimensions are but a few of the points dealt with, while, when each vehicle comes forward annually for relicensing, its exterior and interior condition is subject to inspection.

Before proceeding to discuss details of design and postwar developments, it will be well to obtain an idea of some of the essential requirements from the operating company's point of view. In this connection, the following have been put forward by an authority in England:

In a public service vehicle, prime cost is not of great importance; low operating cost is everything. An average mileage for a private car may be taken as 5000 per annum, and for a truck 10,000 per annum. For a motor bus, it may be from 30,000 to 50,000. To the private car or truck owner, first cost may be as important as running cost, but, as the bus owner's profits are dependent upon the time he can keep his vehicle on the road, it is sounder policy for him to pay a high price for a first-class chassis than to have a cheap one which will require more time in the shop for repairs and replacements.

Standardization and Accessibility

High standards of interchangeability and accessibility are essential to success and this applies not only to detail parts but to complete units as well. Engine, gearset, steering gear or back axle should be readily and individually removable so that any one of them can be replaced by another unit from stores when any except the simplest of adjustments or repairs becomes necessary. Additional first-cost to attain this end should not, within reasonable limits, be considered. With an average mileage of even 30,000, a reduction in operating costs of 2 cents per mile means a saving of $600 per annum, and such a saving obtained by a special if somewhat expensive feature of design may leave a handsome additional profit, even after interest on the extra capital outlay has been paid. With very big annual mileages per vehicle to consider, operating engineers go most carefully into every possibility of reducing running costs by a fraction of a cent per mile.

Low Operating Costs

To the bus owner, in his need for low operating costs and consequent increased profits, accessibility and simplicity are among the first of his requirements. The reliability of the service is dependent upon a constant and efficient inspection and supervision, with the possibility of quickly changing any part not in a satisfactory condition. The quicker any component can be changed the less it costs to do so and the simpler the operation, the cheaper the class of labor that can be employed. If any internal part, such as a piston, gear wheel or differential pinion, cannot be attended to during the few hours of the night the vehicle is in the depot, the whole unit must be capable of easy removal so that a new one can be substituted without difficulty.

The operating cost question also has bearing on the matter of weight reduction. With maximum laden and unladen weights applicable, as in London, the provision of additional passenger accommodation necessitates reducing the weight of the vehicle itself.

Spring design is also an important factor. A motor bus has a load constantly varying between minimum and maximum, and it is not an easy matter to provide springs which insure equal passenger comfort and insulation for the chassis and body under all conditions. Springs which are sufficiently flexible only with full load, or thereabouts, will soon result in complaints being received from passengers and cause the superstructure to be racked and shaken to pieces when the vehicle is run empty or nearly empty.

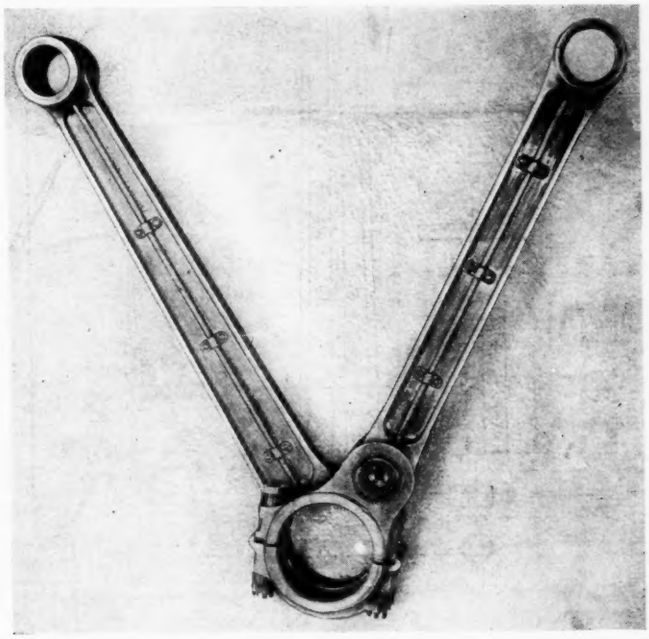
The Rolls-Royce Aircraft Engines Described and Illustrated

Part II.

This is a continuation of the description translated from the German periodical "Der Motorwagen." In this part the crankshaft, the cylinders, the connecting rods, the valves and the valve rockers are taken up. The large table appended gives some general data concerning this series.

THE crankshaft is of the usual six-throw type, and is supported by the upper half of the crankcase in seven main bearings of the parallel type. In order to neutralize as far as possible the bending moments created by the rotating masses, each crank arm is provided with a counterweight of cast steel, which is secured in place by two stud bolts screwed into the crank arm and provided with castle nuts and cotter pins. Lateral displacement of the counterweights is prevented by threaded dowel pins. As a result of the use of these counterweights, it was possible to keep down the weight of the crankcase in spite of the comparatively large cylinder bores. The holes through the crank journals are closed by means of covers and "through" bolts, the latter being provided with castle nuts and cotters. As compared with the rolled-in covers, which are also used in Germany, these covers have the advantage that in overhauling the engine a careful cleaning of the inside of the crank is possible, which is especially urgent if the cause of the need for the overhauling was the burning out of the bearing, in which case some particles of white metal usually get into the bore of the journal, and this may easily start the cutting anew. For the introduction of the lubricating oil to the connecting rod bearings, there are four drill holes in each bearing, so that a very copious supply of oil is assured, especially in view of the fact that oil grooves extend all around the circumference of the main bearing.

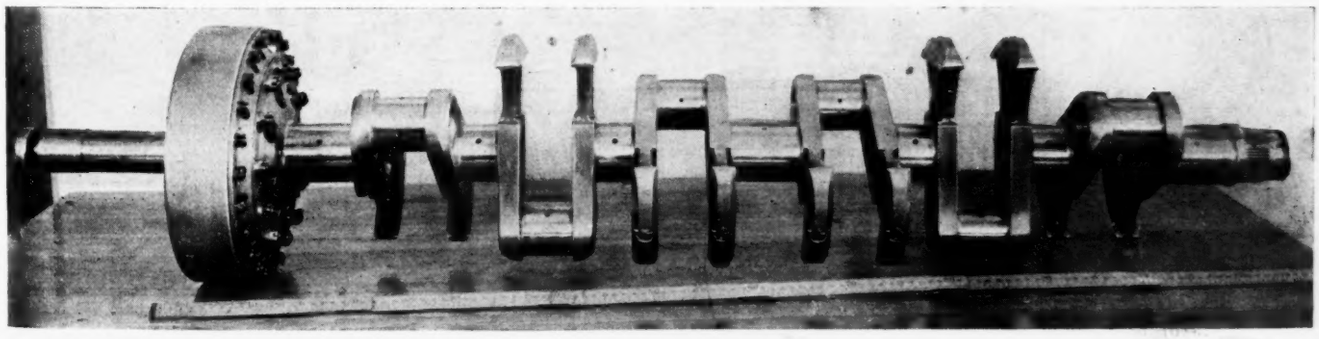
The figures on all drawings used in this article are metric measurement.



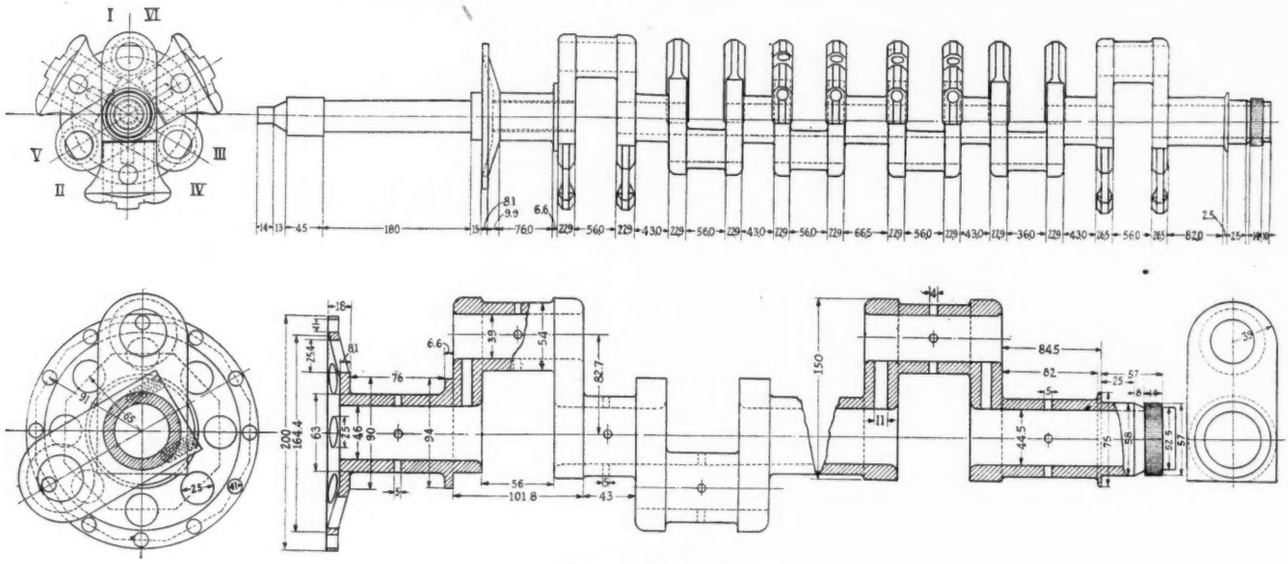
A pair of connecting rods

At the forward end of the crankshaft, there is a flange to which is secured the internally toothed planetary reduction gear wheel. A stud is pressed into the bore of the crankshaft at the forward end, which serves as pilot for the spider of the planetary pinion. The rear end of the crankshaft is serrated after the manner of the Rudge-Whitworth hub, on which serrated portion the pinion for the valve and accessory drive is mounted.

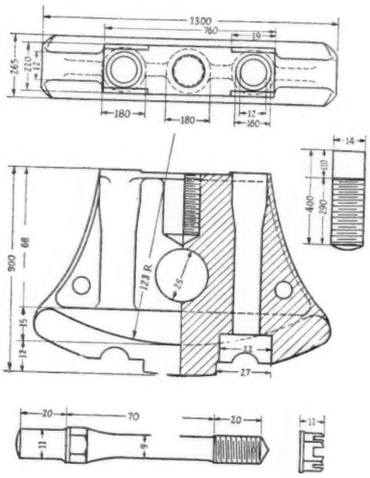
The connecting rods are of H cross section and are are of the linked type. The main rod has no separate bearing bushings, the white metal being poured directly into the head, in order to keep down the re-



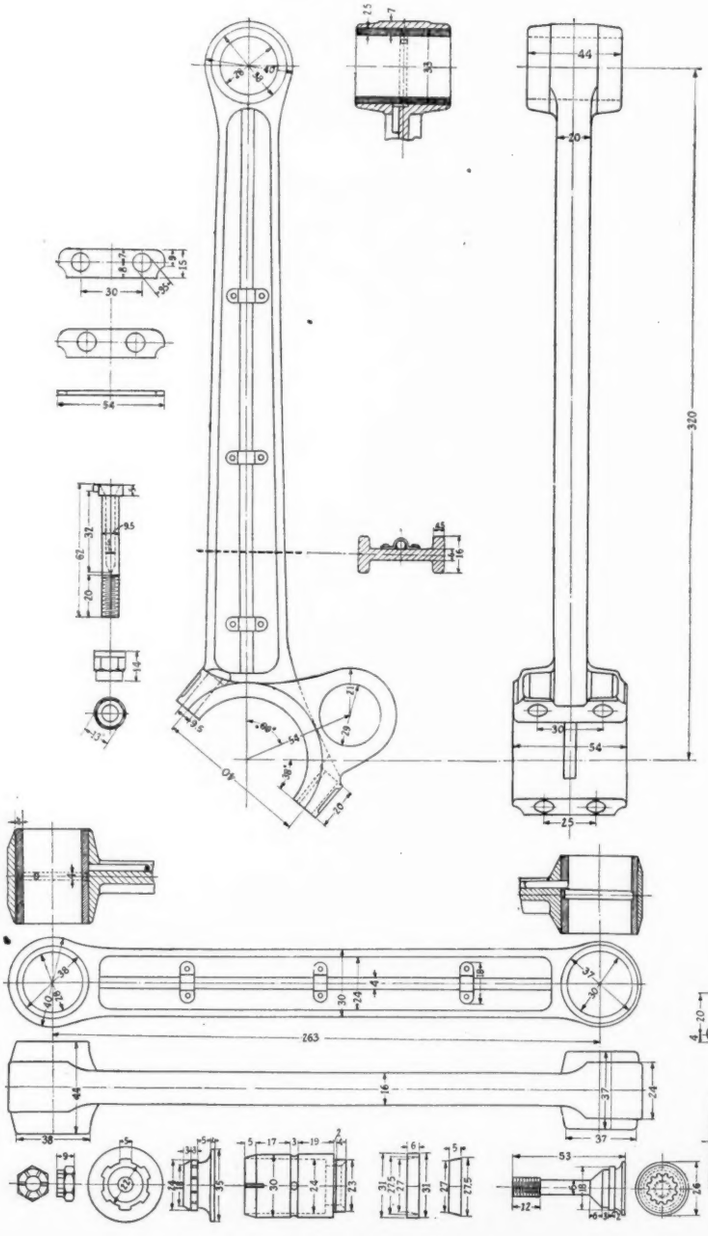
The Rolls-Royce crankshaft

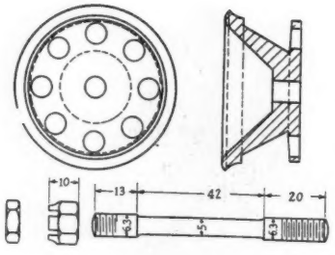


The crankshaft

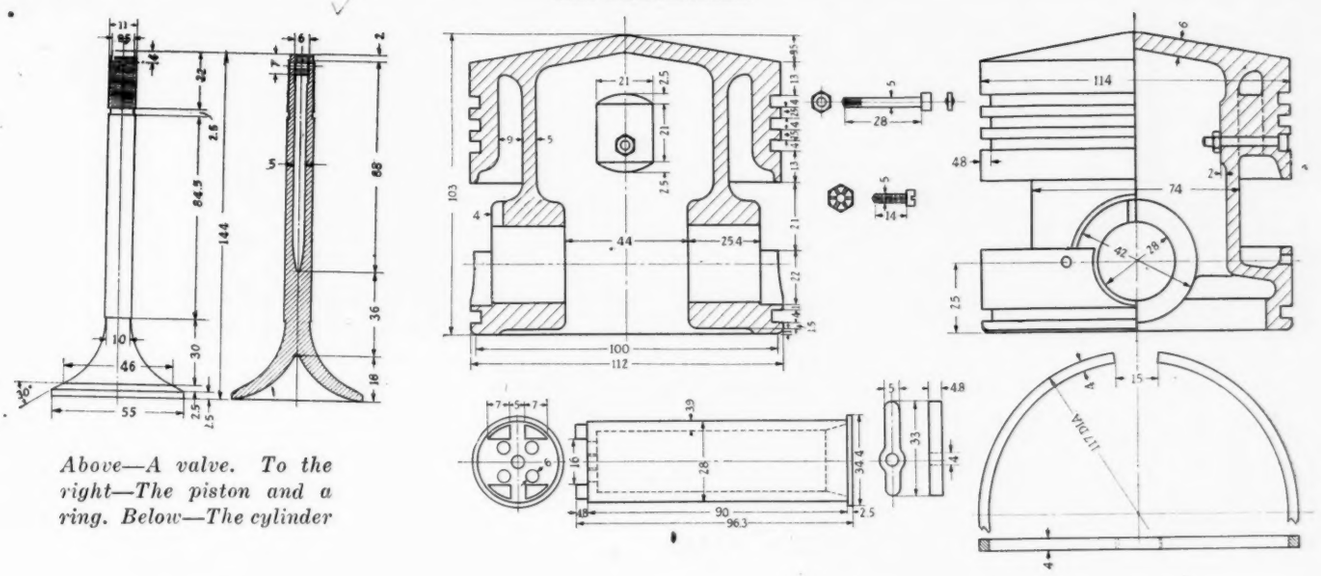


The crankshaft balance piece

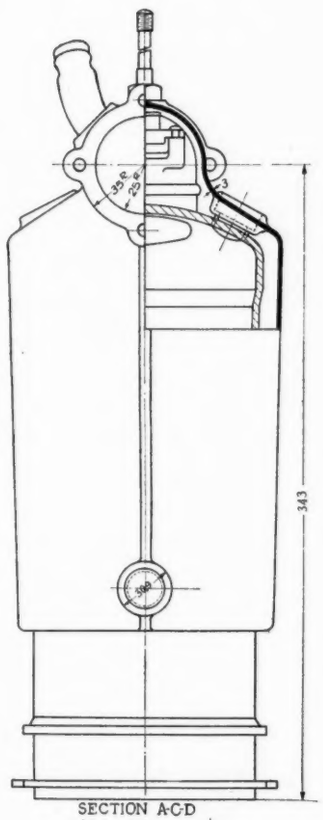




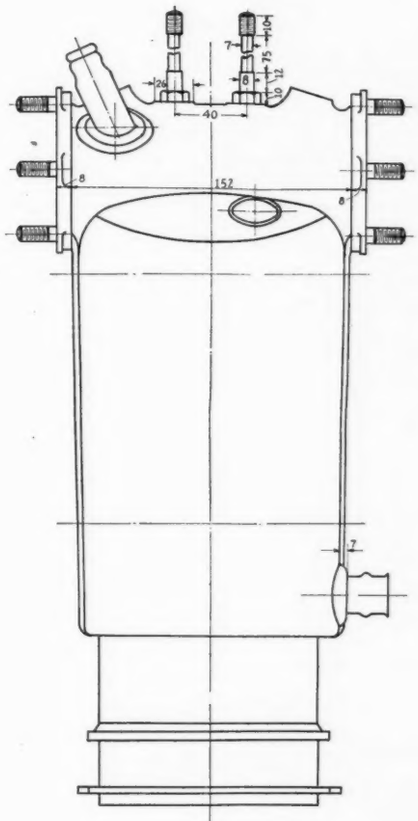
Above — The crankshaft filler piece. To the right —Several views of the two types of connecting rod

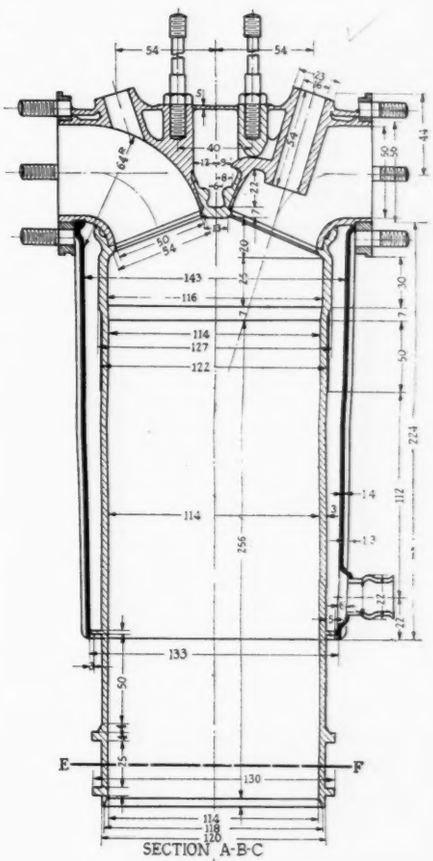


Above—A valve. To the right—The piston and a ring. Below—The cylinder

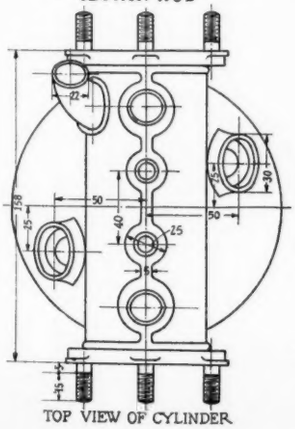


SECTION A-C-D

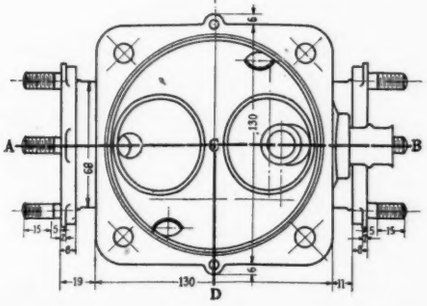




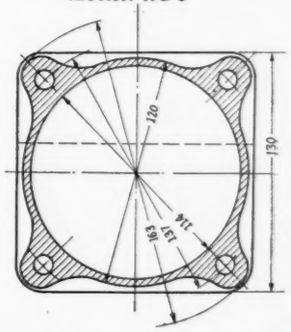
SECTION A-B-C



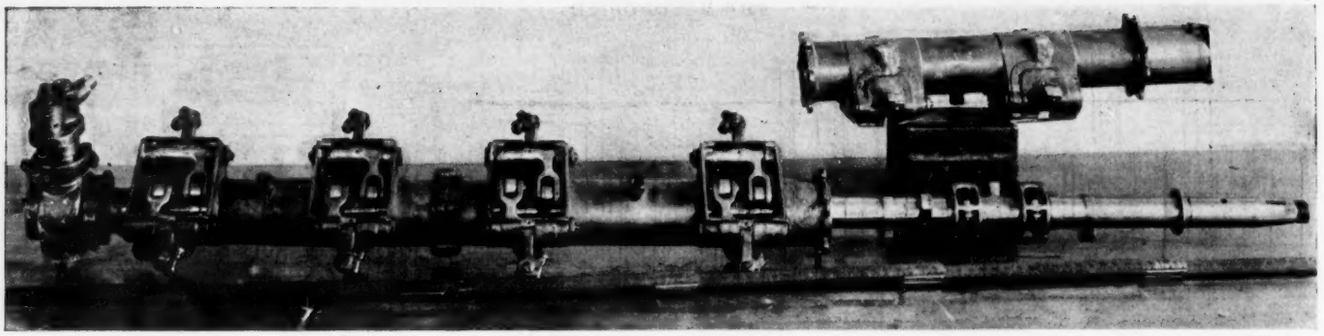
TOP VIEW OF CYLINDER



BOTTOM VIEW OF CYLINDER

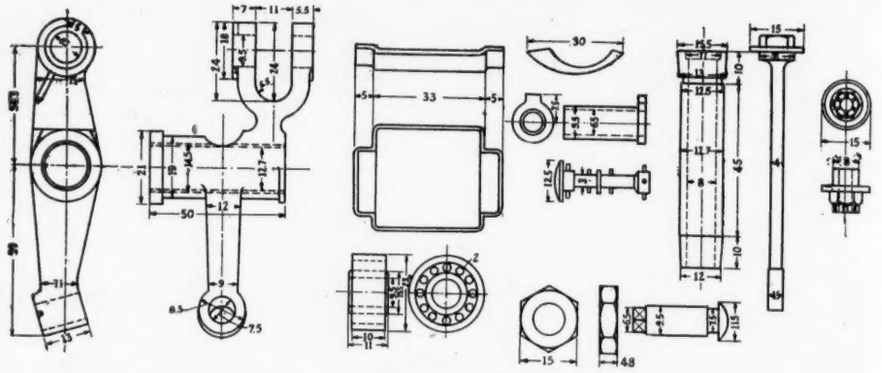


SECTION E-F



The camshaft housing and valve rockers

volving masses to the minimum. An interesting feature is the method of fastening the bolts for the joints of the secondary connecting rods, which are clamped into lugs formed on the main connecting rod on both sides. Lubricating oil is fed to this pin from the bearing of the main connecting rod through a hole drilled in one of the lugs for the secondary rod. The pin itself and the pin bushing are provided with an oil groove running all the way round, in order that the oil will surely get through the oil pipe to the piston pin, this oil pipe being secured to the shank of the connecting rod by means of three "U" shaped clamps. All of the bearing bushings are securely pressed into the hubs of the connecting rod and locked in place by small screws. The maximum loads on the individual bearing occur at 1800 r.p.m. Assuming that the maximum gas pressure on the piston is 426 lb. per sq. in., and disregarding inertia and centrifugal forces, the bearing loads are as given in the table:



Valve rocker details

Bearing	Diameter d in.	Effective Bearing Length b in.	Bearing Load p lb/sq. in.	Circumferential Speed v ft/sec.	Frictional Work pv ft. lb/sec. sq. in.
Crankpin	2.215	1.615	1,950	18.37	35,820
Main Bearing	2.484	1.22	1,116	19.53	21,810
Linkage Pin	1.180	1.334	4,270	.....	.....
Piston Pin	1.102	1.733	3,540	.....	.....

In this table, in calculating the effective bearing surface, a deduction has been made for oil grooves and fillets. In connection with the loads on the main bearings, it has been assumed that the pressure is equally divided between two bearings. The values given in the table are intended merely for comparison and are not absolute values.

The cast aluminum piston also differs greatly from conventional design. In this case, the piston bosses are not cast directly on to the piston skirt, but to a special cylindrical part which is of about two-thirds the diameter of the cylinder bore. The bearing portion of the piston forms a sort of collar to the projecting portion of the piston head and is also secured to the cylinder carrying the piston bosses. There is a recess in the bearing surface at the center. The advantages of this construction

Engine	Rated	At Normal R.P.M.	Data given out by Manufacturer. R.P.M. of Crankshaft Normal	R.P.M. of Crankshaft Maximum	R. P. M. of Propeller Normal	R. P. M. of Propeller Maximum	Fuel Consumption at Normal Hp. Lb. Hp./hr.	Fuel Consumption at Normal Hp. Hp.	Bore	Stroke	Compression Ratio	Mean Piston Speed at Normal R.P.M.	M.E.P. at Normal Output	Weight Without Water and Oil	Weight per Hp. Without Water and Oil referred to BHp. at Normal R.P.M.
	Hp.	Hp.							in.	in.		ft/min.	lb/sq. in.	lb.	lb/Hp.
Rolls-Royce	250	260 (287)	1600 (1591)		1024 (1017)		.567 (.556)	260	4.5	6.5	4.84 (4.66)	1731	103.1 (114.5)	847	3.25
Rolls-Royce	275	300 (307) (309)	1650 (1635) (1616)		990 (981) (969)		.543 (.505) (.503)	300	4.5	6.5	5.00 (4.92) (4.80)	1791	114.8 (118.9) (121.0)	847	2.88
R.R. Eagle	320	320	1800		1080		.485	320	4.5	6.5	5.10	1948	113.1	882	2.76
R.R. Eagle	352	352	1800	2000	1080	1200	.503	320	4.5	6.5	5.43	1948	123.8	948	2.69
Rolls-Royce	190	200	1700		1005		.565	200	4.0	5.75	4.50	1633	106	694	3.47
R.R. Falcon	250	250	2000		1179		.497	250	4.0	5.75	4.80	1910	113.1	717	2.87
R.R. Falcon	264	264	2000	2250	1179	1327	.485	264	4.0	5.75	5.00	1910	119.5	728	2.76

reside in a perfect transmission of the forces from the piston head to the piston bosses, in low bending stress in the piston head and in a greater immunity from deformation through longitudinal expansion of the piston pin. Unconventional also is the location of the piston pins close to the lower end of the piston.

Near the upper end of the skirt there are three piston rings with square cut joints, which are prevented from rotating in the piston ring grooves by means of pins secured into the piston with nuts, located at the joint of the ring. There is a fourth ring at the lower end of the piston, which also serves as an oil ring, as the land below the ring groove is 0.080 in. smaller in diameter than the cylinder bore. Besides, the interruption of the bearing surface at the middle tends to prevent the pumping of oil into the combustion chamber. The piston pin has its bearings directly in the piston bosses without the use of cast-in steel bushings. At one end it is provided with a small flange and at the other end with a screwed on nose in the form of a small flap, which prevents its rotation and lateral shifting.

Cylinders Welded Up of Steel

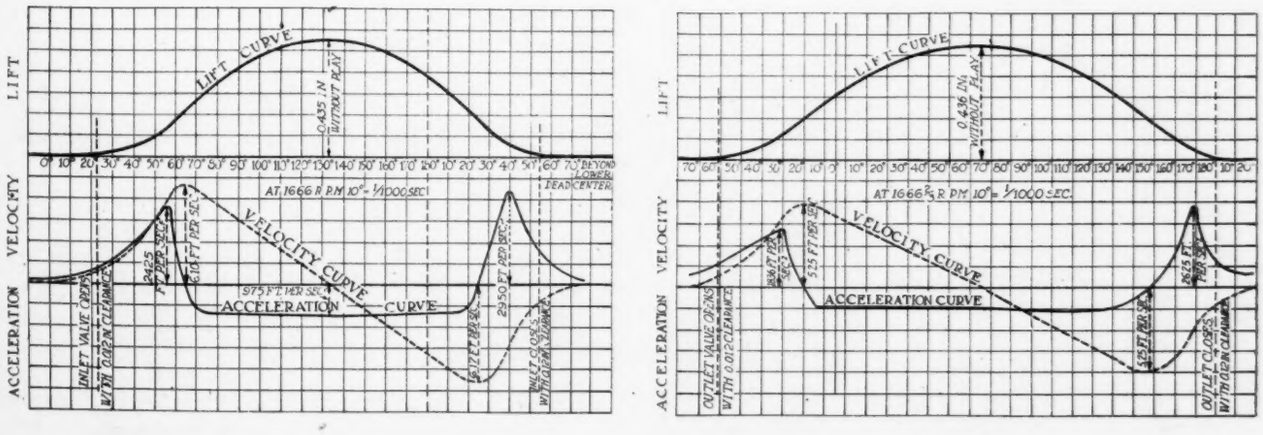
The cylinders are made of steel and are built up out of several parts. In order to prevent the accumulation of material near the valve seats, which occurs at these points in many constructions owing to the valve fittings, there are provided on the cylinders short nipples in which the valve fittings are centered. In this way the welded joint is removed some distance from the valve seat, so that the cooling properties of these important parts are improved. The valve fittings are made of drop forgings, and are milled on the inside. While in the case of the inlet valves the guide of the valve stem is made in one piece with the valve fitting and bosses are forged on for the bolts holding the camshaft housing in place; these parts are made separate in the case of the exhaust valves and welded to the valve fittings, as provision is made for water cooling the exhaust valve stem guides. For the stems of the valves, special bronze guides are inserted. To the cylinders built up in this way, there is welded a cooling water jacket of steel. This is pressed from a single piece of sheet steel, which is bent around an axis passing through the center of the valve housing flange and, therefore, if exception is made of the points at which the water jacket is welded to the cylinder, it has only two welded joints in the longitudinal axis of the cylinder. All the welded joints are exceptionally neat. No more welding material is applied than is absolutely necessary for a water-tight, reliable joint. The spark plug bosses are screwed into the cylinder proper from above, and are welded to the cooling jacket. There are no priming cup bosses. Inlet and exhaust valve flanges are screwed to the ends of the valve fittings. For securing the cylinders to the crankcase, there is provided at the lower end a very substantial double flange, worked from the solid, a design which can hardly be sufficiently recommended for imitation. Water enters the cooling jacket at the lower end, on the outside of the vee, while it leaves the jacket at the highest point on the inside. All of the water outlets of each set of cylinders are connected by a common water return pipe.

Tulip Type Interchangeable Valves

Inlet and exhaust valves are interchangeable. They are of the so-called tulip type, a form which is only rarely met with in aviation motors, but which insures very good conditions of flow for the entering and escaping gases. In order to lighten the valve, the stem is bored out for a great part of its length. To provide a suitable contact surface for the rocker lever set screw, a hardened contact button is set into the end of the valve stem, and locked in place by means of a cotter pin. The washer for the double valve springs is screwed on the stems and held in place by means of a castle nut which is secured by the same cotter pin as the contact button. The lower spring washer is loosely fitted to the valve stem guide.

The valves are actuated by means of a camshaft which has its bearings in a three-part bronze housing. There is no half compression device, and this is probably unnecessary, in view of the relatively small cylinder dimensions.

Lubrication is automatic, through the hollow camshaft. At the forward end of the camshaft housing there is a return passage for the oil to the camshaft, while at the rear end the oil may return through the housing of the camshaft driving shaft. In the older construction either an air pump for the fuel feed or the tachometer drive is mounted at the forward end of the camshaft, while in the newer designs these parts are mounted on the rear part of the crankcase, in which position they are better protected and at the same time the pipe connection and shaft lengths are reduced. The timing of the valves and the opening curves are given herewith. As will be seen, the valve lift conditions of the engine are quite favorable, which, in connection with the high compression ratio, explains the very creditable mean effective pressure of 122.5 lb. per sq. in. in the 352 hp. type.



Inlet *Exhaust*

Valve timing diagrams for the Rolls-Royce engine. The curves show the amount of lift at various angles, the valve velocity and the acceleration

A Study in Charge Proportioning with Heavy Fuels

This is the last of the series by Mr. Tice concerning the tests with the Hinkley engine and heavy fuel carbureter. This article gives the theoretical considerations underlying carbureter operation and shows the means adopted to meet them under varying conditions of throttling and climate

By P. S. Tice*

IT is purposed to complete the group of reports on carburetion requirements and engine performance, resulting from work with the Hinkley 4.5 x 5.5 four-cylinder engine, with the following statement of the natural metering relationships involved in the S H F S carbureter, together with a brief summary of the range of useful supplementary controls afforded in it. This carbureter is of the plain tube type, having fixed adjustments, and no working parts upon which the normal metering fuel depends. Its design has been developed with special reference to the S H F S method of fuel vaporization and to secure in it an inherent metering characteristic closely following the mean optimum requirements of throttle controlled engines. In the earlier papers of this group it has been sought to define the requirements that must be satisfied.

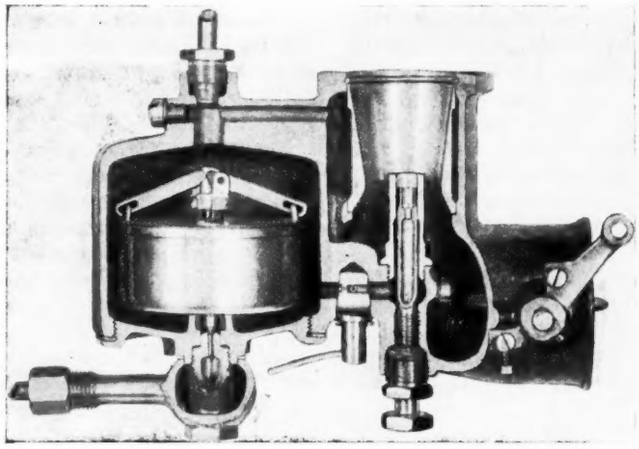


Fig. 1—Sectional view of the Stewart heavy fuel system carbureter, showing location of throttle, construction of the spraying nozzle, and the selective season setting control

Definitions of Symbols

The following quantities are involved in the discussion:

A—weight of air aspirated, lb./sec.;
a—area, sq. in.;
c—a coefficient;
D—density of air in throat entrance, lb./cu. ft.;
d—diameter, inches;
F—weight of fuel supplied, lb./sec.;
k—a constant;
l—length, inches;
N—engine crank speed, revs./min.:
P—absolute pressure in throat entrance, lb./sq. in.;
Δp—pressure difference causing fuel flow;
R—ratio of air to fuel in the charge, A/F;
T—absolute temperature of air in throat entrance, deg. F.
V—velocity, ft./sec.;
v—volume, cu. in.;
(′)—referred to the carbureter throat;
($_o$)—referred to open throttle;
($_x$)—referred to partial throttle opening;
($_1$)—referred to the lower speed; and
($_2$)—referred to the higher speed.

Metering Under Throttle.—In the operation of an engine, the weight of air pumped varies with the crank speed and with the density of air in the intake passage on the engine side of the throttle valve,

$$A \propto ND.$$

Thus, the weight of air taken at a partial opening of the throttle, in terms of that taken at zero throttling, is expressed by

$$A_x = A_o \frac{N_x D_x}{N_o D_o} = A_o \frac{N_x P_x T_o}{N_o P_o T_x} \quad \ldots\ldots\ldots (1)$$

In the case of the carbureter under discussion, the throttle is located in the entrance to the fixed throat (Fig. 1), causing P to vary with throttling. For any given engine speed, $A/D = v$ = a constant; hence P'/P = a constant (P' = pressure in the throat); and the metering head across the fixed fuel orifice.

$$\Delta p = P - P',$$

is proportional to P. Thus, the quantity of fuel discharged may be written in the general terms,

$$F \propto \sqrt{P}.$$

But F varies directly as the velocity of air flow, V, which varies with N. Therefore, the fuel discharge

$$F \propto N\sqrt{P}.$$

From this it follows that the fuel discharge at a partial opening of the throttle is

$$F_x = F_o \frac{N_x}{N_o}\sqrt{\frac{P_x}{P_o}} \quad \ldots\ldots\ldots\ldots (2)$$

The result is that the relative fuel content of the charge increases as the throttling is increased, and

$$\text{Enrichment} = \frac{R_o}{R_x} - 1 = \frac{A_o F_x}{A_x F_o} - 1 = \frac{T_x}{T_o}\sqrt{\frac{P_o}{P_x}} - 1. \quad (3)$$

Generally the air in the throat entrance has a constant temperature throughout the throttling range; thus the enrichment is simply $\sqrt{P_o/P_x} - 1$. This, then, is a statement of the fundamental metering characteristic of the S H F S carbureter.

Theoretical and Optimum Enrichments.—In the upper portion of Fig. 2 is a plotting of the expression $\sqrt{P_o/P_x} - 1$, together with a reference plot of the enrichments required to secure optimum or minimum brake specific fuel consumption in the engine. This latter is computed from

*Director, Carbureter Division, Stewart-Warner Speedometer Corp.

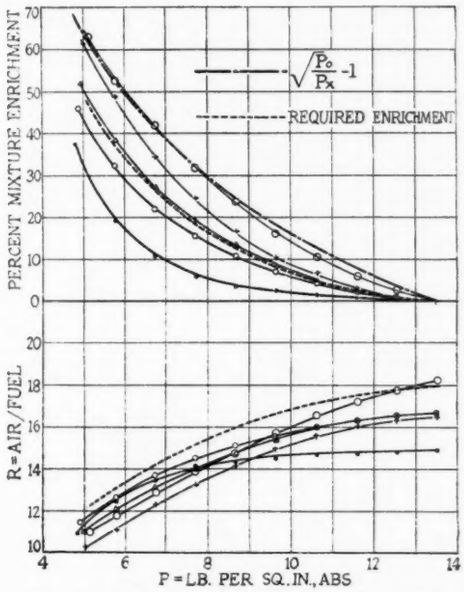


Fig. 2—How the metering relations are controlled to meet the needs of special cases

the curve of required values of R in the lower part of Fig. 2, taken from the report issued earlier under the title, "Kerosene as an Engine Fuel." It will be noted that these two enrichment curves possess the same characteristic form.

Direct Control of Fuel Flow.—Before proceeding to a further discussion of Fig. 2, it will be well to consider the several items directly controlling the rates of fuel discharge. These may be listed as: (1) area of the metering orifice; (2) pressure difference across the orifice; and (3) form of the orifice. It is clear that all three of these factors are closely interrelated.

As the case ordinarily stands, a definite range of values of A exists. This at once suggests control of the metering relations through selection of a throat area to give the most favorable range of metering heads. The area of the fuel orifice, therefore, depends chiefly upon A and the values of V induced in the air stream. These items are commonly manipulated in fitting a carbureter to an engine.

In fitting the present carbureter, there are superimposed upon these general relations two additional factors: (a) modification of the order of variation of the metering head independently of V, and, therefore, independently of the throat area; and (b) modification of the discharge characteristics of the metering orifice itself, through selection of the form given it, independently of the metering heads to which it is subjected.

The Spraying Nozzle Structure

The first of these supplementary controls, item (a) above, results in the spraying nozzle structure used. Reference to Fig. 1 shows that the central air tube of the nozzle is provided with a constriction, the outlet end of which lies in a plane just below that of the openings through which fuel is drawn from the annular space surrounding it. While this annulus is open to the throat, it is obvious that the existence of a pressure in the air tube outlet, materially different from that in the throat, will modify the effective standpipe pressure exerted upon the fuel metering orifice. The action of the nozzle air tube is that of an aspirator, both air and fuel being drawn in through its side openings. Thus it is clear that altering the area of its constriction alters its outlet pressure,

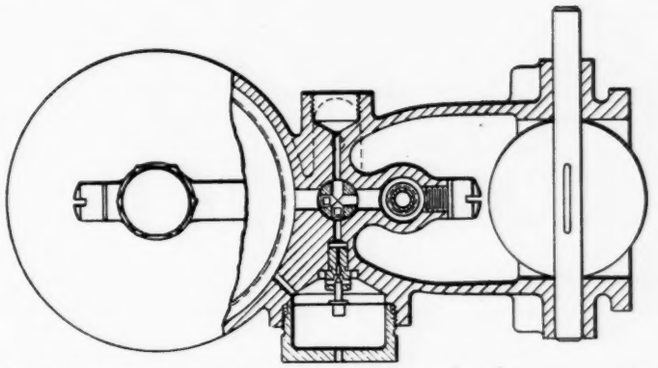


Fig. 3—The auxiliary metering orifice, which gives open throttle enrichments to permit the delivery of maximum power

for a given value of the throat pressure P', and modifies the effective metering head independently of the throat and other main air stream pressures. As will be seen later, the control thus introduced is greatest at the least values of P'.

Discharge of liquid from an orifice is almost always thought of in terms of the expression $F = c\,a\,\sqrt{\Delta\,p}$. If this expression is solved for the experimental values of c, for a set of orifices varying with respect to their diameters and their ratios of length to diameter, l/d, it is found, over a given range of $\Delta\,p$ values that (1) the larger diameters possess the larger c values; (2) smaller length to diameter ratios result in larger and more nearly constant c values; and (3) smaller metering heads result in greater variations in c, with respect to l/d. Considering the permissible ranges of values for $\Delta\,p$, l/d and d, in carbureter practice, it is possible to have an overall variation in c of from 0.45 to 0.95. The latitude of selection is seen to be a wide one.

Special Purpose Enrichment Rates.—Returning to Fig. 2, there is presented a group of five curves of R vs. P, all obtained with the same carbureter, with the same throat tube, under identical external conditions. The test runs from which these data are taken were made with the express purpose of affording experimental expressions of the superimposed controls discussed above. While the R curves are interesting in themselves, and will be specifically discussed a little later, their present significance is only understood from the plots of enrichment in the upper portion of the diagram. It is obvious, it seems, that all the R curves could have been caused to have a common origin had it been thought worth while to devote the time to securing suitable areas in the orifices with which they were obtained.

Curve 1, Fig. 2, it is seen, possesses enrichment rates almost identical with those of the fundamental expression $\sqrt{P_o/P_x}$—1. In this case, the metering orifice was formed in a wall 0.005 in. thick, resulting in a practical minimum l/d, with the coefficient c practically constant throughout. Also, the nozzle air jet was sufficiently constricted to insure its maximum effectiveness as an aspirator.

Curves 2, 3 and 4 resulted from the use of a single metering orifice, slightly larger in bore than in case 1, also formed in a 0.005-in. wall. Here we have, in the order of numbering of the curves, the effects of successive enlargements of the constricted opening in the air jet, starting with an area considerably in excess of that used in case 1.

While $F \propto \sqrt{P}$ almost exactly in case 1, the relationships in cases 3 and 4 follow an expression of the form

$$F = c\,a\,\sqrt{P} - k,$$

in which c and k are constant in case 4 at 1.586 and .00345

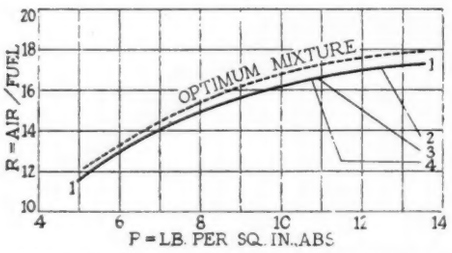


Fig. 4—How the auxiliary metering orifice modifies the mixture ratio in the neighborhood of open throttle

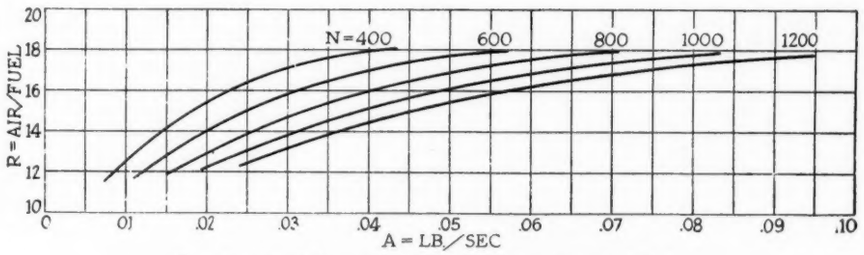


Fig. 5—Variation in the mixture ratio needed to maintain most economical operation over the ranges of speed and load

respectively. In the case of curve 5 the metering port is properly a short tube, with $l/d = 6.7$, operated in conjunction with the same nozzle air jet employed in case 1. Comparing 1 and 5, we have a partial expression of the measure of control afforded by the mere selection of the ratio l/d in the metering orifice; while comparison of 1, 2, 3 and 4 shows the control afforded by selection of air jet throat area.

It is interesting to note that curve 3 practically coincides with that of the required enrichment. Had the area of the orifice been carefully selected with this end in view, the corresponding R curve would have borne the same degree of coincidence to the required or optimum R curve.

Service Settings.—In automotive service there is little to be gained, and possibly much to be lost, if it is attempted to fit the carbureter to deliver the mixtures resulting in minimum specific fuel consumption. In the first place, external conditions of temperature, atmospheric and jacket water may largely determine the values of the optimum mixtures. Neither of these quantities "stays put"; and each new combination requires some reorganization of R, if operation is to be always at the optimum.

R is the weight relation of air to fuel in the charge. $A \propto D \propto P/T$; while $F \propto \sqrt{P}$. Neglecting the possible, but not necessary, effect of T upon F, it appears that $R \propto \sqrt{P/T}$. Since for the same value of P, T will vary in the operation of an engine, and since increased T requires increased R for optimum operation, while in itself causing the reverse, it is seen that realization of minimum fuel consumption under all conditions is impossible with one fixed setting. Furthermore, it is generally proven that the operator cannot be relied upon to produce an average improvement in the situation when provided with a control having sufficient range to permit him to do so. All this takes toll in cost of power, since in order to maintain nicety of operation at low external temperatures the mixture must be rich enough to account for a measure of waste at the higher ones.

Service Settings

Of course, the picture is not all black; the carbureter can include a selective seasonal change in fixed setting, which will afford a great measure of relief; the quality of the charge, with respect to its vapor content, can be made practically independent of the external temperatures; the specific fuel consumption at mixtures somewhat richer than the optimum are but little greater than the true minimum; and both output and sweetness of performance are greater with the somewhat richer mixtures.

As a final word on Fig. 2 it can be stated that three general types of service settings are represented by the R curves, each of particular advantage in a special field. That corresponding to curve 1 is suited to the case where operation is almost wholly in the neighborhood of full load, and maximum economy is of prime importance. Here the jacket temperatures can be consistently high (of advantage with lean mixtures) and the mixtures below three-quarters load are rich enough to permit of assuming that fraction almost at once after starting.

The R curves corresponding to curves 3 and 4 may be classed as desirable for general automobile service, where responsiveness, together with a high average economy, is of chief importance. The R curve for case 5 is best suited to a service where the greater part of the running is done with light load, but in which a powerful response to increased loads is required. The selective setting included makes it possible to employ at will either one of two different metering characteristics in this carbureter.

Maximum Possible Output.—If the reader has followed these reports as they have appeared, it will be clear that with none of the fittings discussed will it be possible to secure from the engine the maximum power of which it is capable. R must be reduced to approximately 12, if this result is desired.

Since there are services in which it is essential that the utmost be delivered by the engine, it is of great advantage to have in a carbureter a control which gives a rapid enrichment in the immediate neighborhood of zero throttling. Clearly much would be lost by maintaining R constant at the value giving maximum output, throughout the throttling range. With the engine throttled and operating on an economical mixture, a demand for more power is met by a further opening of the throttle. But when the demand is such that the mean throttling approaches its minimum value, the only means that will satisfy a further demand is an enrichment of the mixture.

Fig. 3 is a plan section of the S H F S carbureter, including a simple automatic means whereby the results shown in Fig. 4 are accomplished. Located to register with the inactive opening in the selective seasonal setting, is a cross drilling having communication with the float chamber. In this transverse passage is located a fixed diameter metering orifice; and mounted so that it can seat in the approach to this port is a small needle valve secured to the center of a diaphragm, the inner face of which is exposed to the float chamber pressure, while the outer is exposed to the atmospheric pressure.

Since the float chamber pressure follows that in the throat entrance, it is clear that the diaphragm will be deflected to seat the valve upon a sufficient reduction of entrance pressure. The pressure difference across the diaphragm, required to seat the valve, is controlled by the thickness of the diaphragm stock, while the rate at which the effective auxiliary orifice area is changed depends upon the angle of the needle valve point and the diameter of the port upon which it seats.

The curves of Fig. 4 are offered as showing the flexibility of the characteristic performance of this device. A normal metering, without the auxiliary, is shown in curve 1. Curve 2 shows the whole of the enrichment due to the auxiliary orifice occurring in the immediate neighborhood of zero throttling, resulting with a light diaphragm and a blunt needle point; curve 4 shows the whole enrichment occurring at about three-quarters load, with a

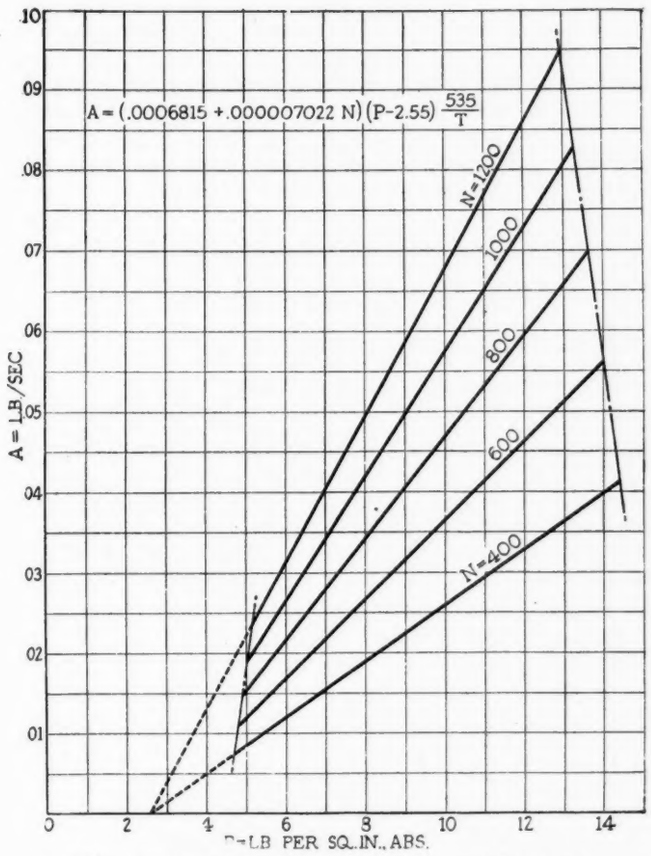


Fig. 6—Experimental variations in weight of air pumped, over the ranges of speed and load

heavier diaphragm and blunt needle; while curve 3 shows a distributed enrichment, resulting from a reduction in angle of the needle point.

This auxiliary apparatus has been reduced to its lowest possible terms, in the interests of simplicity and reliability; and it is actuated by a force that is fundamentally an expression of the relative load on the engine.

Effect of Speed Change.—The foregoing refers specifically to the metering relations at a fixed engine speed. By definition, $P \propto AT/N$. Since enrichment results from reduction in P, it follows from this relationship that increased N will cause the mixture to be enriched. Distinguishing the lower from the higher speed by the subscripts $(_1)$ and $(_2)$, respectively, and substituting for P in expression (3), the theoretical enrichment, $\sqrt{N_2/N_1} - 1$, for a constant air temperature and a fixed value of A.

From this it is seen that the same order of variation in enrichment obtains with change in speed at constant air flow, as with change in air flow at constant speed; and the superimposed controls, as discussed, are equally operative in the one case as in the other. Thus, if the metering relations at constant speed result in optimum mixtures, optimum mixtures will also be had when the speed is changed. That this is a matter of great importance is evident from Fig. 5, a plotting of variation in the experimental optimum mixture with speed change.

It is evident, of course, that such a variation as in Fig. 5 is not necessarily desirable, as, for instance, if the employed values of R are considerably less than the optimum at the lower speeds. But appreciable enrichment with increased speed is not realized in such a case, if the effective enrichments at constant speed are controlled as shown by curve 5, Fig. 2.

In conclusion, it must be pointed out that inherent control of the metering relations, as above, is impossible of attainment in carbureters having the throttle valve in the outlet. In this latter case the change in throat entrance pressure P, upon which control depends, is relatively negligible throughout the complete ranges of speed and throttling.

Fig. 6 is appended to this discussion as being of general interest, in that it shows experimental relationships of A, P, N and T, as influenced by the engine design constants involved in the work from which these data are taken.

Steel for Die Blocks

DIE blocks for making drop forgings are made in four standard grades of steel, of which three are alloy steels. Blocks of chrome steel, heat treated, come ready for service and require no further hardening. This steel makes a good block for medium and heavy forgings, such as crankshafts, gear blanks, etc. These blocks show a normal scleroscope hardness of about 45, but can also be furnished in a hardness of 50 to 55, if required.

Die blocks of chrome nickel steel are furnished both in the annealed and in the heat treated state. When annealed, they show a scleroscope hardness of 30 or less. When heat treated, the hardness varies between 33 and 36. When furnished in the heat treated state, the blocks do not require hardening. These blocks are especially recommended for forgings of heavy sections, owing to the heavy strains to which the die blocks for such forgings are subjected. Blocks of this material can be hardened to a scleroscope hardness of 65.

The third grade of alloy steel from which die blocks are made is the oil hardening chrome nickel steel. The annealed blocks show a scleroscope hardness of 32, while the heat treated blocks show a hardness of 34 to 36. Blocks of this steel are especially recommended for thin sectional, deep impressions or intricate shape forgings. These blocks may be hardened to 70 scleroscope, and in hardening them it is essential that the entire block be immersed in oil.

Blocks of carbon steel are also furnished either in the annealed or heat treated state. The annealed blocks show a scleroscope hardness of 30 or under, while the heat treated blocks show 33 to 35 deg. Heat treated blocks may be sunk without any further treatment. These blocks are especially recommended for upsetting dies. With blocks of this steel, a scleroscope hardness up to 60 is obtained.

In heating die blocks for heat treatment, the blocks are placed in the furnace face up, and an air space of at least 6 in. is allowed between blocks. The blocks are allowed to heat slowly and evenly till they reach a temperature of 1400 deg. F. In order that the block may be thoroughly "soaked," that is, uniformly heated all through, a period of 50 minutes per inch of the smallest dimension of the block must be allowed. The block must be drawn immediately after hardening. If blocks which have been hardened are to be annealed they are heated to 1400 deg. F. and allowed to cool slowly in a sealed furnace.

Before a die block is heated for hardening the impression should be carefully polished. Cold blocks must not be introduced into a furnace already hot. If a block shows uneven heating by uneven color it should not be quenched. The block should not be allowed to become dead cold in the bath.

The above information on die blocks is taken from a booklet on the subject issued by the Pennsylvania Forge Co.

Many Factors Enter Into Purchasing Gear Supplies

This article shows the essential points in selecting the source of supplies in general. The case of gears is taken as an example but the principles involved can well be applied to any other item. The main considerations of obtaining and examining gears are then taken up in some detail.

By D. G. Stanbrough*

WHEN you undertake the purchase of any article, from rough stock to finished parts, the first question that comes to mind is the standing and ability of the vendors of the special commodities which you are purchasing. Your chances of selecting a satisfactory source of supply is governed by the following general considerations:

I—The personnel of the organization.
II—Their financial support.
III—Their general business reputation.
IV—The location of the plant to sources of supply and transportation centers.
V—General business ability.
VI—The labor market.
VII—The general character of the plant buildings.
VIII—The character of their equipment.

We cannot underestimate the value of weighing all these considerations. I will discuss them in the order named briefly.

Personnel.—It is a well known fact that no firm nor its product is any greater than the men who make up that business. A manufacturing organization to be successful should be made up of men who are good mechanics, whose reputations for doing good work have stood the test of time—men who know the proper methods to be used and have courage enough to use them. The organization from a personnel standpoint should be well balanced—should include a good business man, good mechanical talent and a good engineer.

Financial Support.—We cannot underestimate the value of ample financial resources. Such resources will relieve the men who are in charge of operations from worries and allow them to put their efforts on the production. Adequate finances permit the purchase of stock in sufficient quantities to insure a steady flow of product, and this is particularly necessary in the manufacture of gears where many operations and much time is consumed. The firm that is handicapped for money to meet stock bills and the pay-roll cannot be counted upon to produce with the same steadiness as can be expected under more propitious circumstances.

General Business Reputation.—The only thing at all certain about a firm or an individual is its or his record of past performances. Business ability is reflected in the stability of the organization. The prosperity of a company embraces its standing in a community and the re-action is apparent from personal contact with the representative of the firm in business transactions. It is reflected in the measure of good judgment that is shown by a firm's past record, in handling contracts under similar conditions.

Location of the Plant.—Other conditions being equal, it is much better for a firm to deal with a concern in its immediate vicinity in order to minimize transportation difficulties. However, under various circumstances it may be more advantageous to deal with a firm that is close to a base of raw material. These are matters that have to be weighed and judged in each case.

General Business Ability.—A firm's business connections and its contracts with vendors of raw materials, are an important consideration in these times when sources of supply are contracted for many months ahead.

The Labor Market.—Under present day conditions the labor market has an important bearing upon a firm's ability to meet the promises as to production. The labor market must be viewed (1) from the standpoint of supply; (2) from the standpoint of the quality of the supply; (3) from the reputation of the people in the community on questions of strikes and other labor disturbances; (4) with reference to housing and general sociological conditions, affecting the welfare and happiness of the community.

General Character of the Building.—This has particular reference to fire protection, fire underwriter's risks, plant lay-out to facilitate good manufacturing, arrangement of machinery for economical production, and satisfactory working conditions from a labor standpoint.

Character of Equipment.—Good gears can only be produced by modern machinery properly installed, properly maintained and satisfactorily operated. An adequate supply of cutters, hobs, and high speed steel for blading and the necessary assortment of small tools should be on hand. Machines should be placed to permit operation with a minimum amount of vibration. Wherever possible, grinding machinery should be placed on the ground floor. When we are manufacturing gears, we are working within narrow limits, and it is fruitless to suppose that satisfactory results can be obtained in the face of poor equipment and installations. It should be borne in mind that in these modern times heat treatment has a large part in the satisfactory finished product, and the plant that manufactures gears from carbon and alloy steels must contain modern heat treatment equipment, with a thoroughly experienced metallurgist in charge

*General superintendent, Packard Motor Car Co.

Paper read at the Spring meeting of the American Gear Manufacturers Association. Condensed.

of operation. We do not want to overlook the fact that the metallurgical end of the business is highly scientific and is based upon exact knowledge, and cannot be satisfactorily performed by rule of thumb methods without the use of proper standards of comparison.

Having convinced ourselves that the proposed source of supply fulfills a large number of the above requirements, we are next confronted by the fact that satisfactory gears, from a purchaser's standpoint, can only be produced as a result of conformity to good practice along the following lines:

1. Design.
2. Materials.
3. Forgings and castings.
4. Heat treatment.
5. Machining.
6. Hardening.
7. Inspection.

Design.—The good features of gears are uniform sections, tooth form that will most readily meet the requirements as to fibre stress and loading, and a design bearing some relation to the practices of the plant in which the gears are to be manufactured. Take, for instance, the familiar cluster gear used in automobiles. This cluster can be made from the blank with integral gears, or can be made with three integral gears and a fourth gear riveted or fastened to a flange. In the first case, a certain method of cutting has to be employed, and there is unquestionably a considerable loss from warpage in heat treatment. In the other case, the loss from warpage is reduced but, on the other hand, considerable grinding is introduced and a nice fitting job is necessitated. The decision as to the design should naturally depend upon the practice of the shop. Good gears can be produced by either method, and the method to be adopted depends more upon the method in vogue than upon any technical consideration as to the results obtainable with either method.

Another thing in designing gears which needs careful attention, if satisfactory results are to be obtained, is the method of mounting. The best cut gear will not give satisfaction unless properly mounted. Many a noisy gear would not be noisy if run on quiet bearings. The shafts should be stiff, the mounting rigid and the bearings as close as possible to the center of load application. The manufacturer cannot be expected to turn out a finished product which will perform in accordance with the customer's specifications unless the product be given at least fair conditions under which to operate. There isn't any question but that in the past too little attention has been paid to the mounting of gears by the designers, and the manufacturers can do the purchaser a favor and save himself money and avoid misunderstanding by pointing out the deficiency in design before undertaking contracts.

Materials.—Materials for the manufacture of gears should be chosen with regard to the following considerations:

(A) Those subjected to practically no stresses and very light wear (bronze, cast-iron, bar stock untreated and aluminum)
(B) Those subjected to great wear but not severe stresses. (Carbonized—gears of straight carbon stock, made up mostly of bar stock.)
(C) Subjected to extreme wear and considerable stress. (Carbonized and made from forgings of alloy steels.)
(D) Subjected to severe impact and other stresses with normal wear. (Made from forgings of high grade alloy steels, not carbonized but oil treated.)
(E) Gears which are subjected to extreme wear and extreme stresses should be made from self-hardening steels which have been forged.

Forgings and Castings.—Where the design specifies castings we are not confronted by any very serious considerations. However, it is important to keep the sections uniform in order to guard against shrinkage cracks. This is particularly true with cast steel gear blanks. Liberal fillets should be allowed. With cast iron gear blanks in order to obtain long life, it is important that the combined carbon be high and the metal should be cast to give the necessary chill to retain a sufficient quantity of the carbon in solution. Of course, it should be realized that a point can be reached at which it would be impossible to machine the stock without annealing, and it is desirable to keep below this point. Most satisfactory castings will be found to be about 35 hard by scleroscope reading, and have a combined carbon content of between 0.30 and 0.50; the total carbon of such iron is about 3 per cent, with the silicon from 2.50 to 2.75 per cent. With castings of bronze and aluminum no particular difficulty is encountered.

The forging of gear blanks presents a considerable problem. To get satisfactory results we have to consider the subject of temperatures at the beginning of the operation and at the end of the operation to see that one is not too high and the other not too low. Each kind of steel has its best forging temperatures. Too high a temperature produces burnt gears, and too low a finish temperature results in cold strains. These strains, when relieved in heat treatment, reveal cracks, fissures, etc. Overheated gears are not economical, because of the added expense necessary in corrective heat treatment. Attention should be paid to the method of forging gears, in regard to type of forging machine used. Generally speaking, the flow lines of the metal in a forging should be at right angles to the forces applied to the gear teeth while in action. This applies more to gears subjected to extreme stresses than to gears subjected to wear only. A flat gear can be produced under the drop-hammer, whereas one having an extended boss or offset, and which is comparatively long, can be best produced with a forging machine.

Closely related to this subject is the problem of the proper type of furnace to heat stock and the proper charging of the furnace. It can be readily realized that the proper heatings can be obtained by charging a certain definite number of bars which will be some function of the hammer output. The size of the hammer has an important bearing upon the purchaser receiving a proper gear. A large gear cannot be satisfactorily forged with a light hammer, owing to the number of blows that would be required to close the dies, resulting in a too low finish temperature.

Heat Treatment.—We have found that practically all gears that have been forged should be given a preliminary heat treatment before machining. This applies particularly to those gears which are subject to great stress and which must be quite free from distortion after the finish heat treatment.

This initial treatment is carried on in several ways, of which two are predominant. On the milder steels, from which gears are made that are not subjected to great stresses, we anneal or normalize only to destroy or nullify whatever stresses have been set up in forging, and to render the gears suitable for machining.

With the more delicate steels, however, from which gears are made, this normalizing treatment is not enough, and we must first quench from a suitable temperature and then draw back sufficiently high to make the gears machinable. After heat treatment the purchaser should see that certain minor operations are undertaken in order to assure a satisfactory product. Pickle to remove sand and scale, and sand blast to reveal shrinkage cracks, cold shuts, fissures and other surface defects.

Of course, it is not necessary for me to touch upon the fact that this also makes the machining easier and saves tools and cutters.

Machining.—In the manufacture of gear blanks it is, of course, important that the surfaces are held parallel and that they be machined true with the holes in the blanks. It has been our experience that broaching will give a straighter hole than reaming. Gears that have splined holes should be machined from the splines, both in the blanking and cutting. I want to touch upon the important subject of having the proper amount of back lash. It should be seen that the gear rolls without interference and that teeth have a proper and full length bearing. It is also essential that the pitch line be concentric with the hole or shaft the gear locates from. Good results can be obtained by either of the three methods of gear cutting, that is, hobbing, planing, and disk cutting, and the method will depend upon the experience of the shop in which the gears are made, and to a further extent, in some cases, upon the design of the gear.

Locating for finish grinding bores and faces plays an important part and, in passing, it might be well to explain the advantages of the various methods. Probably the simplest method is that of locating from the periphery. The method next easiest is that of locating from the root diameter, and the hardest method, by pins from the pitch line.

Locating from the root diameter, in our opinion, is the most practical way to grind spur gears. In using this method, it is necessary to finish-cut the root diameter at the same time the pitch diameter is finished. The locating pins with this method can be made stationary, which in itself is an advantage.

The method of locating from the pitch line with loose pins, however, has given very satisfactory results. It is probably a little less accurate owing to the fact that warpage has a greater effect upon the pitch diameter. Locating from the periphery is open to the objection that greater accuracy in the primary operation is entailed in order to get good results, as the periphery of the gear is not finished in cutting except when special cutters are employed. Further objection to locating from the periphery is due to the fact that burrs are often thrown up which, if not taken off, will result in errors.

Hardening.—All gears made from carbonized stock are finished-machined before final heat treatment. Gears which are oil treated, as a general rule, are finished-machined before final treatment. When we start upon the final heat treatment of a finished gear, we are facing trouble. Various methods have been employed and we have finally settled upon a treatment of gears by the "hump" method.

Distortion in gears, we have concluded after many tests and experimentations, is due not to temperature, changes in quenching and lack of jigs and fixtures, but is rather dependent in a large measure upon heating. Therefore, the rate of heating, together with the establishment of constants in quenching, can be relied upon to solve problems in gear distortion, which formerly, we believe, could not be controlled. We can attribute the solution of these problems to the development of the electric furnace. In our shop we can show you the record of long years of work that have culminated in the development of a method of heat treatment that eliminates distortion.

Inspection.—After the purchaser has satisfied himself that the various conditions tending to the production of a satisfactory product are present, he is faced with the inspection of the finished product, and the question naturally arises as to how deep this inspection should go. One of the things that we are very much interested to know about a gear is its hardness, and the scleroscope offers a method which is practical and lends itself easily to shop use. It should be realized, however, that the scleroscope permits of a comparative test only. Standards of hardness for the particular result must be established.

The work of inspection is to see that in so far as hardness is concerned the gears follow within the limits that have been allowed. In the use of the scleroscope we have found that each operator should be familar with certain definite procedures:

1. To adjust the clamping stand so the machine will be level.
2. To test the machine on a testing block before starting the job and at least once an hour during the day.
3. To see that all work has a clean polished surface before testing.
4. To hold the machine firmly on work being tested.
5. To place the work in a vise-like fixture or in a "V" block to obtain the reading.
6. To have the machine cleaned and adjusted at regular intervals by the man in charge of them.
7. Never take a reading when the hammer falls more than once in the same place.
8. Take readings from more than one spot, probably four, by revolving work of a cylindrical nature or the opposite faces of rectangular work.

These points are covered by the Shore people in their instructions in a general way, but we have found that the enforcement of the above routine will assure satisfactory results and assist in maintaining standard.

The Brinell test will be found satisfactory in laboratory work and in testing samples and establishing standards. However, up to this time we have not been able to apply it to production methods, in view of the fact that the method cannot be made fast enough to handle large numbers of small parts on which 100 per cent inspection is required. After the hardness test, each piece should be subject to very rigid inspection under good lighting conditions to discover cracks or seams, which may develop after the final hardening operation.

With reference to inspection for tooth forms, it has been our practice to employ a rolling fixture where the gears are mounted at the correct center distances and rolled with a master gear to insure a smooth roll. Our practice has shown that we can obtain better results from hand rolling than from power speed types of rolling fixtures. The gear, of course, should be tested for back lash and for accuracy of the other dimensions specified in accordance with the accepted inspection practice.

IN HIS search for methods to simplify and make more efficient his operating methods, the busy executive has turned frequently to the use of graphic charts. It has not always been possible, however, for him to go as far in this method of presenting data as he would have liked, since some forms of charts seem extremely complicated.

It is possible, however, for anyone to understand and use many forms of graphic charts without a knowledge of the mathematics involved in them, according to Allen C. Haskell, author of "How to Make and Use Graphic Charts," a book recently published by the Codex Book Co.

The book is built up in progressive steps, so that the person unfamiliar with graphic methods may, by beginning, be capable of mastering each step as he reaches it. This has been accomplished in an effective manner. The various types of charts such as rectilinear, logarithmic, semi-logarithmic, polar, isometric, trilinear, and nomographic, are discussed, followed by a description and analysis of charts for various purposes.

A Carbureter Design Which Employs a Swirling Motion

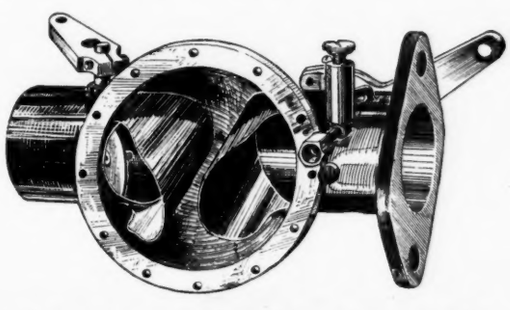
This carbureter has baffle plates to cause the mixture to swirl instead of the more conventional design for direct passages. In a rough test recently conducted a Ford car equipped with such a carbureter made a run with a gas consumption of 27.4 miles to the gallon, without any accessory aids.

A CARBURETER of simple design and which gives excellent fuel economy, has been invented by Geo. M. Brown of New York and is illustrated herewith. It is of the plain nozzle, concentric float type and its characteristic feature is the formation of the air passage. Usually the aim in carbureter design has been to make the air passage through the carbureter as short and direct as possible, in the interest of high volumetric efficiency. Mr. Brown, on the contrary, makes his air passage purposely tortuous in order to produce a swirling or centrifugal motion of the air.

The model herewith illustrated is of the side outlet type and is specially designed to be fitted to Ford cars. The mixing chamber, which is located directly above the float chamber, is of spherical form and contains two curved baffle plates which determine the flow of the air through it. These baffle plates are secured to the upper half of the spherical mixing chamber and extend straight down into the lower half, leaving, however, a passage between their lower edge and the wall of the lower half of the mixing chamber through which the air must pass. The air enters through the inlet on the right, which may be closed by means of a choke valve for easy starting. The baffle on this side turns it downwardly, causing it to pass around its lower edge. At the center the two baffles are only 3/8 in. apart and the spray nozzle, which is screwed into the bottom of the mixing chamber and extends into the float chamber, is located between them.

After having passed the first baffle, the air gets into the central space of the mixing chamber, and thence on past the second baffle into the outlet passage. As the air passes the edge of the first baffle, it enters a chamber of considerably larger section than the inlet and outlet passage, which has a tendency to cause it to swirl. Upon the form of the lower edges of the baffles Mr. Brown depends for the automatic proportioning of the fuel mixture at all air speeds.

There is a secondary fuel nozzle in the inlet passage just beyond the throttle valve, which communicates directly with the float chamber. This can be adjusted by means of a readily accessible needle valve.



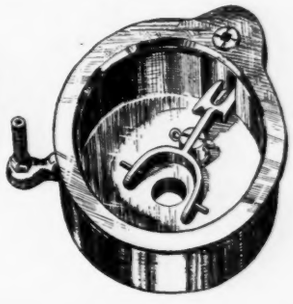
Top half of mixing chamber, showing baffles

The automatic regulation of the mixture is described by Mr. Brown as follows: "The particular shape and disposition of the opening from the mixing chamber into the outlet duct is of prime importance. The current of air through the mixing chamber is directed toward the upper end or ends of the elongated outlet opening when the engine is running light, and as the load is increased the current of air increases in volume and approaches more closely to the fuel nozzle. If the elongated opening were of substantially the same width throughout, the current of air would approach the nozzle relatively rapidly, and for most conditions of operation would therefore accelerate the supply of fuel to the mixing chamber too rapidly. However, by providing lateral enlargements or by otherwise regulating the effective size of the outlet throughout its length, the current of air, as it increases in volume, can be caused to approach the fuel duct only sufficiently rapidly to increase the aspirating effect at the proper rate."

A representative of AUTOMOTIVE INDUSTRIES recently accompanied Mr. Brown on a trip in a Ford car fitted with his carbureter, from the center of New York City to Ossining on the Hudson and back to Tarrytown. The trip included both city and country driving over roads for the most part well paved, although in some parts the pavement was rather rough. The car throughout the trip handled well, showing good acceleration, good "hanging on" qualities at sharp bends combined with grade, and speed up to 40 m.p.h.

At first the carbureter was run with the hot air connection originally supplied with the car, but after about 10 miles driving this was disconnected and for the rest of the trip cold air was drawn into the carbureter directly. When starting from the garage in New York the fuel tank was filled to overflowing and the speedometer reading taken. At Tarrytown, at the conclusion of the run the tank was filled again, and as near as could be ascertained with the measuring appliances available at the garage it required 1.6 gal. The distance covered by speedometer was 43.8 miles, which works out to 27.4 miles per gallon.

Lower half of mixing chamber, with spray nozzle



Float chamber with float removed

French Desire American Competition in Grand Prix Race

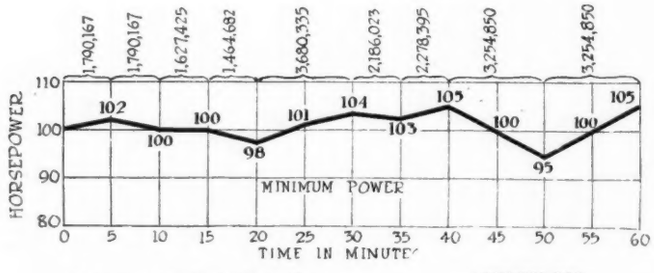
The first after-war revival of this old contest will be held next summer probably near Strasbourg. The race regulations show engines are limited to 183 cu. in. and must undergo strenuous bench tests. Although the date has not been fixed, July probably will be named.

By W. F. Bradley

THE French Grand Prix automobile races, interrupted by the war, will be revived next summer. The regulations, which have just been published, call for cars with an engine of not more than 3 litres (183 cu. in.) piston displacement, and a minimum weight of 1763 lb. with four wheels, tires and oil in the base chamber, but without water, gasoline, spare parts, tools, or spare wheels. The driver and mechanic together must weigh 264 lb., or sealed ballast to equal this amount must be carried. There are no chassis or body restrictions, other than a maximum length of tail of 59 in. measured from the rear hub cap to the extreme rear.

Before the race, all engines must undergo a bench test, when 30 hp. must be developed for 15 min. at 1000 r.p.m. and 90 hp. at 3000 r.p.m. for the same length of time. After these two preliminary tests, there will be a 60-min. brake test, when the power must not on any occasion drop below 90 hp. at 3000 r.p.m. No car can start in the race unless it has successfully passed the bench tests. Starting positions in the race will be determined according to the integrated engine output during the bench test, the first to start being the one whose power-time curve for the hour shows the greatest number of foot-pounds of work done. In case of equality of power, the engine with a diagram most nearly approaching the horizontal will be classed first.

During the hour test, the engine must not be stopped, nor must the power at any time drop below the minimum of 90. If these conditions are not fulfilled on the first trial, four attempts can be made, providing the interval between them is not greater than 20 min. The preliminary and the final tests must be made on the same day, the maximum interval being not more than 30 min.



Min. No. of Foot-Pounds.....175,761,900
No. of Supplementary Foot-Pounds..... 21,237,896
No. of Ft.-Lbs on which starting order is based 196,999,796

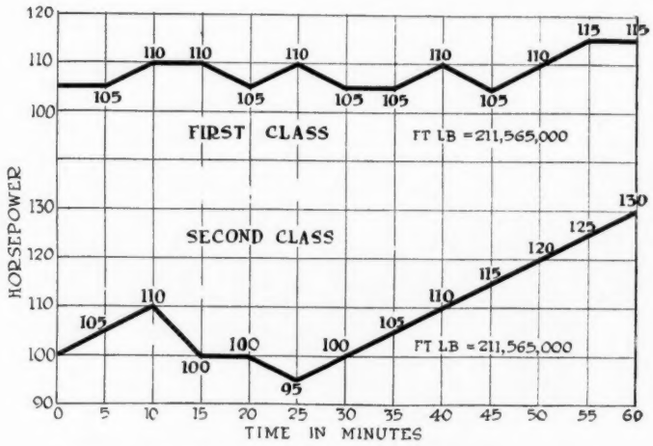
French Grand Prix engine tests. The above diagram shows how power is calculated

Note: One French or metric hp. = 542.47 ft.lbs. per second.

It has not yet been decided where the race will be held, but all probabilities are that a course will be selected near Strasbourg, in Alsace. There are other candidates for the honor, notably Lyons and Le Mans, but it is recognized that the reconquered province should have first choice. Should Strasbourg decline the invitation the competition will lie between Lyons and Le Mans. Total distance will not be less than 350 miles, but this can only be settled when the district has been decided on. The nature of the course adopted will influence the details of the car to some extent, particularly as regards brakes, wheelbase, number of gears, etc. No date has been fixed, but the month of July is practically certain and the most probable date between the 10th and 15th. It is believed that by selecting such a date sufficient time will be allowed American competitors to reach France.

Entry fees are 20,000 francs for one car, 35,000 for two, 47,500 for a team of three, 57,500 for four cars of one make, and 65,000 for a full team of five cars. They should be sent to the Sporting Commission of the Automobile Club of France not later than Dec. 31, 1920. At double fees entries will be accepted until Feb. 28, 1921.

It is evident that the Sporting Commission does not intend to admit late enemy subjects in the race. Entries are to be by invitation and the Commission has the right to refuse any entry without explanation. Thus, without actually declaring that Germany is boycotted, cars from there will be kept out. This is the only possible way of handling a delicate situation, for, even if the Racing Board had no objection to late enemy entries, it is certain



The upper diagram would be classed ahead of the lower one, for the line more nearly approaches the horizontal

that the French public would refuse to attend a race with German cars and drivers, and it is even doubtful if the teams could find housing and garage accommodation anywhere in France.

American competition is expected and hoped for, it being recognized, since the last Indianapolis race, that racing experts in the United States are now in a position to line up in a French Grand Prix with the best products of Europe. While an engine built for Indianapolis would be suitable for the French road race, the chassis would have to be special or modified. Although the interval between the Indianapolis race and the Grand Prix is ample for drivers to come across the Atlantic and practice, the time is rather short for shipping cars and it is doubtful if the actual Indianapolis cars could be used. The suggestion made by Capt. E. Rickenbacker at Indianapolis that a national team should be got together and sent to France, has been taken seriously and attracted a lot of attention here. There is a feeling that this suggestion will be carried through and that in consequence a powerful American set of cars may be expected.

The announcement of a revival of automobile racing in France has been received with general enthusiasm. Engineers, however, are not allowing themselves to be carried away, for the technical program is difficult and there is a disinclination to submit to a bench test which will allow rivals to collect valuable information. Some admit that they are not at all sure of being able to fulfil the double requirement of 30 hp. at 1000 revolutions and 90 hp. at 3000 revolutions and, in consequence, they will not take part in the Grand Prix.

While the Sporting Commission of the Automobile Club of France has acted with the best intentions and with technical improvements in view, it is really not in a position to carry out a bench test of the nature proposed. The club laboratory is small, inadequately equipped and altogether unsuitable for accurate tests of racing engines developing more than 100 hp. Better results could be obtained by using the modern laboratories of one of the automobile factories or the Government Air Service laboratory. The bench test, too, will be a serious disadvantage to foreign competitors who will have to bring their cars specially to Paris. It would facilitate matters if the club allowed foreign competitors to take the bench test at home, under the control of an independent technical committee.

Danish Four-Cylinder Motorcycle Has Pressed Steel Frame

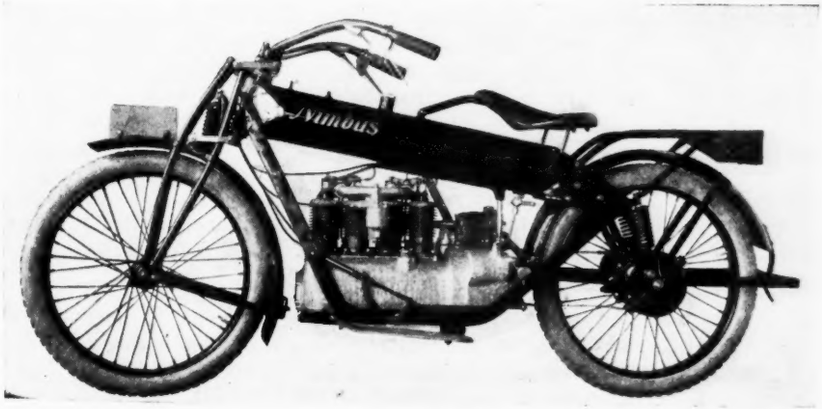
FORMERLY the American Henderson shared with the Belgian F. N. the distinction of being the only quantity-made four-cylinder motorcycles. Now there is a third model of this class, the Danish Nimbus, which also has the unconventional feature of a shaft drive. It is built by Fisker & Nielsen, Ltd., 30 Peter Bangsvej, Copenhagen, a concern which has for many years built electric vacuum cleaners. A new factory is now being erected and the capital has been increased preparatory to putting through the first series of 1000 motorcycles. The experimental machines have gone through five years of tests.

The engine has 2 3/16 x 2 13/16 in. cylinders (45.76 cu. in. piston displacement) and is rated at 7 hp. The gear box is integral with the engine, and the enclosure of the kick starter in the engine casing, as may be seen in the right side view, is an innovation. The connecting rods are drop forged; they have phosphor bronze bearings at the top and are lined with white metal at the bottom. The crankshaft is a one-piece job and is supported in three bearings with force feed lubrication. The camshaft is driven direct from the crankshaft and runs in ball bearings. The inlet valves are mounted directly above the exhaust, in order that the exhaust valves may be cooled by the incoming charge. Lubrication is fully automatic and is taken care of by a simple piston pump, which has been subjected to a test equalling a speed of 112 m.p.h. The oil is carried in a sump which is fitted with an oil gage. The connecting rods dip into individual troughs. The multiple disk friction clutch runs in oil and can be operated by either hand or foot.

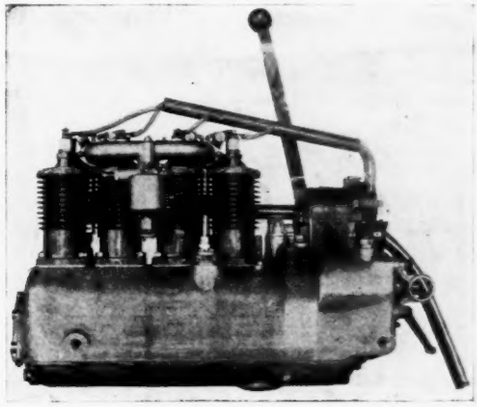
The automatic carbureter is mounted so as to be equidistant from all four inlet valves. Both the nozzle aperture and the air supply can be adjusted while running. The fuel tank, of 3⅓ gal. capacity, is made of steel sheets forming part of the frame. The tank is provided with a valve controlling a reserve supply of 3 pints.

There are three speeds and two neutral positions. The gear ratios are 4⅓, 6½ and 10⅓. A locking device prevents gear changing when the clutch is engaged. Speedometer drive from the gear box is provided for. A universal joint, allowing springing of the rear wheel, is interposed between the engine and the drive shaft.

The foot brake operates internally on a drum, rigidly connected to the rear hub, while the hand brake acts externally on the same drum and is operated by a grip below the right handle bar, the height of which can be adjusted. The carbureter is regulated by turning the right handle bar grip, and ignition is controlled by turning the left.



The Nimbus motorcycle, with pressed steel frame and 55-inch wheelbase



Nimbus four-cylinder engine, rated at 7 h.p.

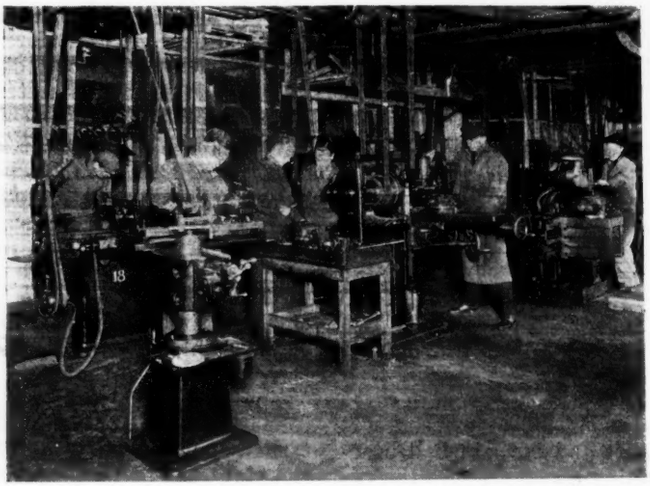
Men Trained for Automotive Work in Typical Training School

Training courses, similar to the one described in this article, have been established in many cities throughout the country. This is a non-commercial school which is training men for practical machine tool and garage work. The men are paying for the instruction themselves.

By Norman G. Shidle

THE cost of breaking in new workmen is recognized as an important item of manufacturing expense, yet the fact that it is usually absorbed by overhead charges probably obscures its magnitude to a large extent. Whether a new man is trained in a special training course or is broken in through actual shop practice and experimentation, his training is a definite cost to the company.

One large automobile concern which operated a training school for operators during the war found that it cost about $66 to train each man, the course given lasting about one 48-hr. week. Thus it cost the company approximately $1.37 an hour to break in new machine operators. When a company has thus trained a man, he sometimes leaves that plant and takes his experience and services elsewhere.



Group of students in machine tool school

The West Side Y. M. C. A. Automobile Mechanics' School in New York is training machine operators and garage repair men for automotive work at cost prices. Its work school is interesting chiefly as a typical example of what is being done in many other cities, as similar courses are being offered in various cities, including Detroit, Boston, Seattle, Philadelphia, etc., while a school will be opened in Cleveland within a few months.

Although differing in details, the idea behind each of these courses is identical and all are operated along similar lines.

The work being done by this school and the other Y. M. C. A. training courses throughout the country is of special interest to the automobile manufacturer, since skilled workmen can never be found in sufficient abundance. The problem of obtaining really competent machine operators is always a vital one in every automotive plant.

The man, himself, since he is the chief beneficiary of the training which he receives, pays for his own course of instruction. While this is the case with practically all of the students in this training school, there is no objection to a manufacturer taking advantage of the school's facilities to send any employee whom he might wish to benefit by the training. The training given is entirely of a practical nature and is so mapped out that a man can take exactly what he wishes at practically any time convenient to himself.

The school is broadly divided into four parts:

1. Principles and elementary practice for chauffeurs and owners who wish to know something of the cars they are driving.
2. Garage repair work.
3. Machine tool work.
4. Tire repairing and vulcanizing.

The first division, though largely attended, is of but slight interest from the standpoint of the automobile manufacturer.

The second division contains some interesting methods, while the results of its work present significant facts. The course in repair work takes from three to six months, the cost to the man being $30 for 72 hours of work. Since the instruction is given at cost, it is fair to say that the cost of training men for garage repair work under this system would be about $0.43 an hour.

When a man has finished this course he is capable of doing general garage repair work on practically any standard type of car. Actual repair jobs are done by the men taking the course. Usually old cars, which need complete overhauling, are bought for the purpose. These cars are later resold after they have been repaired and overhauled by the students. Only complete overhaul jobs are done, the entire cars being taken apart and put together again. Thus the man gains a knowledge of repair work on all the parts of the car.

After such a car has been completed, it is taken out for a road test by the instructor and later by the technical expert in charge of the school. Any defects then found are noted and are again adjusted.

Training Machine Tool Operators.—Fifteen machine tools comprise the battery on which men are trained for practical automotive work in this school. Three shifts of students are worked on these machines, enabling a total of 60 men to take the course at the same time, each man still being assured of a machine during his entire

instruction period. The approximate cost of training a machine tool operator is about $1.14 an hour, this being the rate at which the men pay for the instructio . This rate is probably higher than actually necessary because of the fact that, for purposes of expansion, depreciation on the machines is being written off more rapidly than necessary.

The following table indicates in detail the instruction which is given to a man in teaching him to operate a lathe. Similar charts are made for each operation which is taught.

1. *Tool Grinding Practice*
   (a) Explanation
   (b) Grinding tool No. 7 (Front roughing)
   (c) Grinding tool No. 9 (Front finishing)
   (d) Grinding tool No. 10 (R. H. Side tool)
   (e) Grinding tool No. 11 (Threading tool)
2. *Explanation of Lathe Parts*
   (a) Names, use and operation of parts
   (b) Truing up centers
   (c) Changing of gears for feeding
   (d) Putting in back gear
   (e) Removing chucks and face plates
   (f) Removing centers
   (g) Direction of feed for heavy cuts
   (h) Shifting cone pulley belt
3. *Methods of Centering Work*
   (a) Center head, scriber and center punch
   (b) Chuck and use hand or lathe tool
   (c) Chalk
4. *Setting of Tools*
   (a) Explanation—in holders—against work
   (b) Turning of piece No. 1
   (c) Pressure and lubrication of centers
   (d) Outside calipers—instruction and practice
   (e) Micrometer—instruction and practice
   (f) Resharpening tools—where to grind
5. *Chucking, Drilling, Boring*
   (a) Explanation—using first small and then large drill
   (b) Reaming—without power
   (c) Boring—piece No. 2
   (d) Explanation—setting boring bar—importance of short bar
   (e) Inside calipers—instruction and practice
   (f) Explanation—drive, sliding, running fits
6. *Fitting Piece No. 1 and No. 2 Together*
   (a) Vernier—instruction and practice
   (b) Explanation—use of mandrel
   (c) Pressing pieces together
   (d) Turning to Vernier measurement
7. *Thread Cutting on Piece No. 1*
   (a) Cutting of threads
   (b) Explanation and practice, setting compound rest to 30 deg.
   (c) Right hand V
   (d) Left hand V
   (e) Double V
   (f) Explanation, figuring gearing for thread cutting
   (g) Explanation, taking up play in feed screws
   (h) Thread chasing
   (i) Marking for jumping threads
   (j) Using reverse belt
   (k) Thread cutting dial
8. *Thread Cutting (Inside) Piece No. 2*
   (a) Use of indicator to true work in chuck
   (b) Cutting internal threads to fit piece No. 1
   (c) Instruction—figuring size of hole for full thread
9. *Taper Turning (Inside) Piece No. 2*
   Instruction—degree to set compound rest for taper in feet
   Turn taper as per Blue Print using compound rest
10. *Setting of Work in Lathe—Piece No. 3*
    (a) Face and center drill using chuck and steady rest
    (b) Grinding tool No. 4—right-hand side tool, steel
    (c) Using automatic cross feed
11. *Turning and Undercutting Piece No. 3*
    (a) Grind tool No. 1—front roughing, steel
    (b) Grind tool No. 6—parting tool
12. *Cutting of Threads—Piece No. 3*
    (a) Cutting V thread
13. (a) Grind tool No. 13 Acme thread
    (b) Cut Acme thread
    (c) Explanation, depth of Acme thread
14. (a) Grinding tool No. 14 square thread
    (b) Cutting square thread
    (c) Instruction, use of spring tool holder and two width bits
15. *Knurling—Piece No. 3*
    (a) Cut knurl
    (b) Explanation, making hand grip and ... ging diameter
16. *Turning Taper (Outside) and Boring—Piece No. 3*
    (a) Turn taper outside with taper attachment
    (b) Making fit to gauge
    (c) Turn taper with compound rest
    (d) Drilling and boring blind hole with use of steady rest and tying dog to face plate
17. *Chucking, Facing and Turning—Piece No. 4*
    (a) Instruction, use of chucklines in centering work
18. *Turning Eccentric—Piece No. 4*
    (a) Lay off piece, throw off center, using center indicator and turn eccentric
19. *Drilling—Piece No. 4*
    (a) Drill hole and tap out
    (b) Instruction and practice; procuring fine finish
20. *Turn, Thread and Drill—Piece No. 5*
    (a) Turn, cut thread, put radius on head and drill
    (b) Chucking with split nut
    (c) Use of hand tool
21. *Turn Up Gear Blank—Piece No. 6*
22. *Setting Up Work on Face Plate, Explanation*
23. *Making Parts and Review*
    (Specify what is made)

Following are the machine operations which are taught, together with the number of hours necessary to complete the instruction:

	Hours
Milling machine	88
Lathe	88
Shaper	22
Grinder	44
Drill press	11

The men do their work from blue-prints, so that when they have finished the course they are able to read such drawings. While the man works on a machine during his entire course, he is given something of the principle as well of the practice of the operations which he is performing. When he has finished the course he understands thoroughly the job which he has learned and is capable of going into a shop and turning out satisfactory work as to quality. It is probable that he will need several days' practice before he will become adept in quantity production.

At a time when the cost of industrial training is almost an unknown quantity, except insofar as manufacturers recognize that it is probably much greater than it should be, the costs and results of such a school as the West Side Y. M. C. A. school in New York are worthy of examination. It will be interesting to note how the training costs of this non-commercial school compare with the costs of the training schools which are beginning to be established in various parts of the automotive industry.

Minneapolis Idea on Tractor Design

MOST of the members of the S. A. E. Minneapolis Section are engaged in the manufacture of farm tractors in one way or another, and at the meetings of this section topics connected with tractor design are usually discussed. During the past winter, the various parts of a tractor were taken up in succession, and all the possible methods of construction discussed pro and con. At the end of the meeting, a vote was taken to ascertain the concensus of opinion of the membership present on the features discussed. The discussion was limited to the 3-4 plow, wheeled tractor.

A report on these meetings was made at Ottowa Beach by Chairman A. W. Scarratt of the Minneapolis Section. The features which received the greatest number of votes were as follows: Weight, 5000 lb.; drawbar-pull, 3200 lb. at plowing speed; belt speed, 2600 ft. per min.; plowing speed, 3.5 to 2.75 m.p.h.; height of drawbar, 17 in.; vertical adjustment, 4 in.; horizontal adjustment, 18 in.; front steering wheel, 36 in. in diameter by 6 in. width of rim, with square section skid rings; knuckle type front axle; wheelbase, 84 in.; rear driving wheels, 54 in. in diameter by 12 in. width of rim; live driving axle, with flanged edge rim; average wheelbase at rear, 52 in.

The Manufacturer's Idea of Education for the Engineer

Co-operation between our educational institutions and industries in the training of engineers is the theme of this article. In it, Mr. Chapin shows that the lack of commercial knowledge and the failure to receive practical training have handicapped many engineers in their life's work.

By Roy D. Chapin*

As we all know, there is a great lack of co-ordination in the present relation of technical schools to industry. Some industries have been wise enough to take advantage of this. They have kept in touch with many of your colleges and have made it easy for your students to find employment in their organizations. Frequently this has not been the best thing for the future of the graduate. The ease with which his first job was obtained has caused many a man to ally himself with a type of work without any particular future and for which he found too late he was not temperamentally fitted. It seems highly important that graduates should start right immediately they leave their alma mater. We all know the increase in responsibility the minute a man marries and the tendency that he then has to hold to the work he is doing rather than take the chance on a change which might permit him to go far ahead.

Does not this prove two facts? First, that an attempt should be made to divert men to other college courses who demonstrate they are not fitted to be successful engineers, directing them to those courses to which they seem best suited. Second, that you should give the student the training which will let him become a producer immediately upon graduation and along a line in which he knows positively that he is fitted to work.

It is a general remark in industry that when the average technical school graduate takes his first job he is inclined to think he "knows it all." He desires too much salary for what he can return to his employer, and becomes impatient if advancement is not very rapid. Some employers dislike to take men direct from school and would rather let some other factory give them their first training with the idea that they can then hire them later. Usually men just out of college are paid from 20 to 50 per cent more if they have had summer work along the lines of their specialty or have had previous shop experience.

Why should all this be so? The answer seems to be unanimous that lack of practical training in college necessitates such training after leaving college, thereby holding a graduate back until he has secured a happy combination of both theory and practice.

It is impossible to reproduce in your college laboratories or shops the actual conditions within industry. In general, the most successful engineers are those in whom there has been developed a commercial instinct which so guides their engineering work that the results pay out. We have had many graduates in our engineering department who, fresh from college, were entrusted with occasional attempts on design work. The results from the new men have been far from satisfactory. Their designs are usually commercially impractical, showing insufficient regard for cost of manufacture, length of time involved to bring through the design, availability of the new material specified, or the cost of scrapping the old materials.

Everyone knows that there is a tremendous field to-day in industry for those men who will assume responsibility and who are real executives. The engineer should think outside of his job, should have courage to take responsibility and go ahead. However, to do this he must have a solid foundation of well-rounded training, and it is the consensus of opinion that as yet you men are not furnishing that solid foundation for the average graduate. One well-known and successful engineer has told me that the majority of engineering graduates seem to have acquired the information imparted to them, but only a few of them have actually learned to apply that information in practice.

IN preparing this address, Mr. Chapin communicated with many industrial leaders, particularly in the automotive industries, concerning the problems of personnel training, a subject upon which he had given much previous thought. The answers to his communications have been made into the composite that is presented here.

In talking with young engineers six or eight years out of college, they have regretted their lack of practical experience, felt their progress had been slowed up, and several of them were not optimistic over the future of strictly engineering work. They said that they had no business training and from an executive standpoint they were not confident enough of themselves. Perhaps the answer to this might be that they should have made it a point to secure this training since they left college. Again the human equation enters and we deal with the tendency of most men to stick to what they call a steady job rather than take chances on what you might term an instructive job.

I have investigated to find what opportunities are presented to-day for undergraduates to secure practical experience along their line of study. Of course, the summer vacation period has offered the greatest chance. However, the work done is usually without any particular supervision and without an appreciation by the employer of what the boy is heading for. Properly supervised, I believe that credit can well be given for certain work done during summer vacations.

*Address delivered before the annual meeting of the Society for the Promotion of Engineering Education. Condensed.
Mr. Chapin is president of the Hudson Motor Car Co.

COMPLAINT has been made to me by engineers who have been out of college some years that their profession does not receive the recognition given to that of law or medicine. Their previous training requires an unusual amount of hard work and they have felt the results obtained have not justified their intensive preparation. Analysis of this lack of recognition would seem to indicate that too many so-called engineers have undertaken their profession without any particular fitness for the work. Again, the actual quality of the work of an engineer can perhaps more easily be checked up than that of a lawyer or physician. In other words, his results are placed upon a dollars and cents basis and he is paid accordingly. The third fundamental reason would seem to be the lack of ability on the part of many engineers throughout their career to make a genuinely practical application of their training. Too often they are not ready for executive work when the opportunity arrives. Business heads are also at fault in employing too cheap or inexperienced engineers for big jobs, then blaming the profession instead of themselves.—*From Mr. Chapin's address.*

Every executive and engineer with whom I have talked and corresponded is very favorable to co-operative engineering courses between the college and industry. All of you are doubtless familiar with these courses at the University of Cincinnati, University of Pittsburgh, the new courses at Harvard, and the co-operation between the General Electric Co. and the Massachusetts Institute of Technology. The University of Detroit has placed a number of men in our factory and many other plants in the city with very successful results. The men have taken a real interest in their work and the reports from our factory favor such co-operative plan as producing better engineers. Dr. Hollis Godfrey, president of Drexel Institute, has well recognized this need of co-operation and, with Doctor Capen, is heading a large movement to bring about closer relations between colleges and the men who employ their graduates. Doctor Godfrey tells me he is meeting with great success in his plan and it merits the heartiest of support.

Every investigation points to the desirability of practical training. If we are agreed that this is so, how can the colleges best adapt their engineering curricula to meet the needs of the situation. Building up an actual working arrangement with various industries is a slow process for any college. Some of you have such co-operation now well under way. Others are contemplating it. To those who have not effected such co-operation the time is surely here to make a survey of all industrial possibilities in your section and to interest industrial leaders in your plan.

It is not necessary for me to suggest the type of co-operative arrangement to be worked out, as some of your institutions already have ample experience available to you. Investigation seems to indicate that those colleges with co-operative courses are exceedingly popular with the students and particularly with the type of students who realize that their college training is just as much their business in life as their life work will be after graduating.

In addition to the practical training, it seems a general opinion that every engineer should be made to take a certain number of courses in business administrations, thus furnishing a groundwork for later executive opportunities and a truer aspect as to what is commercial engineering. Everyone with whom I have talked thought this of primary importance. You can confer a favor too upon literary students by offering those students who are going into industry an opportunity, by virtue of short courses in the engineering department, to learn how to read a blueprint and at the same time to get some conception of what part engineering plays in all industry. My college experience was confined to literary work with optional courses in law. Actually, a better conception of engineering on my part would have made my first years out of college much easier in an industry where engineering plays such an important part. However, a knowledge of the laws pertaining to patents and contracts is valuable to all business men and particularly to the engineering profession.

Automotive engineering is now so ramified and calls for so many men that I am sure your institutions will do well to study keenly its future. Outside of mechanical, chemical, electrical and metallurgical engineering, the newer great developments are coming in highway, traffic, transport, and safety engineering. Incidentally, automotive engineers should always have some training in highway engineering that they may appreciate the relation between their product and the roadbed it traverses. Enormous appropriations are being made for highway construction in this country and, at a conference in Washington this spring called by Doctor Claxton, of the Bureau of Education, it was quite apparent that the demand for highway engineers as well as highway transport engineers is already far in excess of the facilities of the colleges of the country to turn them out. I am sure that the automotive industry will gladly co-operate in any of your plans looking to specialization in automotive subjects.

One other point seems to be of interest to the men with whom I have talked. They feel that great results can be accomplished in your research work and methods. Perhaps quotations from some of them will interest you. A well-known engineer says:

"I am strongly in favor of a certain kind of research for seniors—a sort of easy research with practical application that will not present problems so hard as to discourage the man who is working on them, and yet difficult enough to give him a sense of accomplishment in overcoming the obstacles that arise and different enough from his ordinary work to catch his interest at a time when a good many men begin to go stale. Research work of a different type, more difficult and perhaps more theoretical, is justified in post graduate courses and as subjects for faculties to work on."

Another suggested that engineering colleges should have the opportunity of comparing their research results with those of the industrial laboratories to the benefit of both. He thought that the Bureau of Standards or the National Research Council might well co-ordinate research reports from all technical colleges, thus preventing too much duplication, and at the same time encourage efforts in needed directions.

In conclusion, it seems quite apparent that more practical training must be given as part of the engineering courses and that it is most desirable that the professors and instructors should actually know by personal experience what this practical training constitutes. America is entering a period of enormous industrial expansion and with her rapidly growing export trade our engineering methods are fast coming in competition with those of the European engineers.

Claims Engine Horsepower Formula Honors

Editor AUTOMOTIVE INDUSTRIES:

J. W. Fraser in the issue of AUTOMOTIVE INDUSTRIES dated May 20, 1920, asks why the formula

$$\frac{D^2 N}{2.5}$$

was adopted. It was (?) simplified from my formula

$$\frac{B^2 \times S \times \text{No. of Cylinders} \times \text{Revs.}}{12{,}000}$$

This formula I evolved in the year 1902 from the brake horsepower tests of over 500 gasoline engines. At that time there was no formula in existence.

As a designing engineer I felt the need of one, and first for my own use collected the necessary data from which to compile one. Of course the "dividend" adopted was that evolved by Watts, but the problem was to find a "constant" which could be used as a "devisor."

I first got copies of bench tests at the company I was employed by (The Motor Manufacturing Co., Coventry) and prevailed upon my friends with other companies to provide me with the results of bench tests of several other makes of engines. From this collection of data I evolved the "constant" 12,000 for engines dimensioned in inches and 200,000,000 for engines dimensioned in millimeters.

For a time this formula was only used by myself and my fellow draughtsman, but in 1904 I sent it to the British motor journal, *The Automotor*, and I hold their receipt dated November 11, 1904, signed by the technical editor, A. G. New. In 1905 I sent it to the publishers of "The Mechanical World Pocket Book," a pocket book which is in the possession of practically every technical man in Great Britain. The formula appeared on page 160 of the issue dated 1906 which was on sale at the end of 1905. It will be wondered why I am thus going so closely into dates, so I will now give the reason. In 1909 I was laid up with a severe illness, and in reading up the accumulated numbers of the British motor journal, the *Autocar*, I found that in the correspondence column of this journal, Mr. Dendy-Marshall and John Jay Ide were wrangling over the authorship of the formula in question. In his letter to the *Autocar* dated July 17, 1909, Mr. Dendy-Marshall states that the authorship should surely attach to the man who first published it.

Now I would call attention to the fact that although I brought forward the foregoing conclusive evidence and offered £10 to any hospital named if anybody could produce earlier publication than my own, the *Autocar* has never referred to the formula as the "Speight" formula, but has since several times referred to it as "The Dendy-Marshall Formula." There is no great value to be attached to this formula, but what little honor is due should be attributed to the right person.

Lengthy correspondence appeared in the *Autocar* between Mr. Dendy-Marshall, John Jay Ide and myself on this subject, consequently when Ralph C. Chesnutt in his letter in AUTOMOTIVE INDUSTRIES, dated March 18, 1920, rather questions the right of John Jay Ide to the authorship, the latter replies in the issue of May 6, 1920, that the formula was devised independently by Mr. Dendy-Marshall and himself in December, 1906, but totally ignores the fact that I sent it to the *Automotor* in 1904 and that it was spread throughout this country in 1905 in the "Mechanical World Pocket Book."

In conclusion, I would state that I do not think the formula in question should be used without revision. It would be a very poor tribute to our designers to assume that there had been no rise in efficiency in the petrol motor since 1902.

A. SPEIGHT,
European Accessories Manager,
Waltham Watch Co., Ltd.,
London, England.

Machining Unusual Universal Joint

Editor AUTOMOTIVE INDUSTRIES:

THE "novel form of universal joint" shown on page 83 of the July 8th issue, is manufactured by the Coates Clipper Mfg. Co., Worcester, Mass. The machine used to produce these "gears" are those of the Standard Mfg. Co., shown in the May, 1920, issue of *Machinery*. The universal joint itself was illustrated and described in the November, 1909, issue of *Machinery*.

I note, however, that the "Coates" joint employs the center of the face as a center of rotation, while your correspondent (H. W. R.) shows the action of the joint around the center of the sphere; that is, around the apex of the gears.

In this event, the gears comprising the joint might be laid out and cut as involute crown gears; the tooth profile, however, must necessarily derive its form from the smallest angle at which the gears must operate, and considerable backlash must be expected when the axes are normal to each other, that is, operate as shown in the sketch. In addition, the angles of operation would be very limited. A low obliquity would favor the operation of such gears, say as low as 4 deg. Whatever form of tooth is used in the gears as shown, study their action as that of bevel gears.

CHARLES H. LOGUE.
Consulting Engineer, Brown-Lipe Chapin Co.

THE German Minister of Public Economics has forbidden the exportation of aluminum, lead, zinc, tin, nickel, copper and alloys of these metals. The prohibition became effective on March 5. Another order prohibits the exportation of mineral oils. The prohibition of exports of machines, electrical instruments and automobiles is more rigidly enforced.

IN Christiania and all large cities in Norway the maximum weight allowed on the rear axle of motor trucks fully loaded is 4400 lb. An exemption is obtainable, however, from the Department of Public Works allowing a total weight up to 13,200 lb. irrespective of the distribution. Electric motor trucks are said to have grown in popularity lately throughout Norway.

The American Stand on the Left Hand Drive in England

Governmental decisions as to the use of the right or left hand drive in the British Isles, owing to a strenuous newspaper campaign being waged, may be expected shortly. The viewpoint of an American exporter is given here.

THE agitation in England against the use of cars with left-hand drive has reached a point where the Departmental Committee on Motorcar Regulations must take notice of it and hand down a decision to end the controversy. Gen. Sir Henry Maybury is chairman of this committee. The agitation has largely been conducted through the newspapers, which have featured accidents in which a left-hand drive car figured. The motor papers have not been active in the campaign and their writers apparently do not see serious objection to the left-hand drive, despite the fact that the rule of the road is to the left in England, instead of to the right as in other countries.

The chief result, however, of this policy would be to stop the importation of French and American stock models into England and to give the English manufacturer a much clearer field than he now has, certainly an unsportsmanlike and selfish aim.

In this connection, the following letter directed to General Maybury by Col. Fred Cardway, vice-president and general manager of the Packard Motors Export Corp., becomes of considerable interest. The letter, which follows, needs no comment for the fair dealing proposition it presents:

MY DEAR SIR:

For several months a number of British newspapers have carried on a systematic campaign against American motor vehicles. Their attack was conducted against motor carriages or trucks equipped with left-hand drive, which according to their version are dangerous and their use should be prohibited.

I am not questioning whether left-hand or right-hand drive is the appropriate equipment for Great Britain, because the answer is so obvious that it does not seem to need discussion. The great number of left-hand drive vehicles in England and right-hand drive in America prove sufficiently the adaptability to any traffic system.

The question in my mind is, however, as to who is behind this movement—the British public as a whole, or directly interested parties, such as manufacturers.

To my mind the answer seems quite natural. The British public have purchased American cars equipped with left-hand drive, I assume, because they liked them. If the individual did not care for such vehicles, the dealer handling them would undoubtedly find it out before long, because he would find no market for his product.

I am the first one to indorse any demand of the British motorist because he has a perfect right and privilege to demand for his money what he wants. If he does not like left-hand drive he has the right to ask for right-hand. If he does not care for an American body he is entitled to express his criticism and no one will be able to force him to make a purchase of a vehicle he does not care for.

It is an evident fact that the British public have purchased left-hand American cars and thus indorsed the American vehicle. Does it seem just right that a directly interested party should be allowed to start a systematic public campaign, assume the position of a public spokesman, and try to make use of the Government of Great Britain to pass a law forbidding the use of motor vehicles indorsed by the public?

Having followed with serious concern the press campaign, I felt the necessity of appealing to the American manufacturer and put the matter up to him for consideration. We have quantities of imported right-hand drive vehicles in New York and in America, and no doubt British manufacturers expect to ship their product to this country as soon as they are in position to do so. The thought came as to whether we should take in this country similar action—a matter which would be relatively easy, inasmuch as the automobile industry holds quite a prominent place in our country's business. However, such action would be very narrow-minded, and not just a gentleman's way of doing business. Therefore I have suggested not to use methods in our effort to clear the situation which are not dignified or which should not be used by men thinking internationally.

The world has grown very small and the interchange of thoughts and merchandise is growing greater year by year. No country with vision can afford to-day to isolate itself from the rest of the world because conditions do not permit it. Great Britain and America, speaking the same tongue, will be thrown together quite a bit in the world's commerce, and it shall be necessary for both of us to take the broader view.

The British public has always had a world reputation as being fair and sportsmanlike in every one of its dealings. American manufacturers do not ask for any undue favors, but it seems regrettable that activities of an interested party should carry a reflection upon the people who have through the purchase of our products indorsed their value.

If our merchandise is not right, we shall bow to the British public and do as it says, but if we are subjected to a deliberate attack, as has been the case, it will be necessary for us to take steps to uncover the source of the activities and then through a similar press campaign lay before the public the facts, so that it may see both sides of the story.

My object in writing you is to make you see our viewpoint, with an expression of hopes that Great Britain and America might work together individually and industrially to the success of both nations.

Moral Obligations of the Individual in Industry

In past times the social standing of the producer was affected by the quality of his product. Since the industrial revolution this has not been true. Industrial harmony can only be attained by both employers and workers assuming certain individual moral obligations.

By Harry Tipper

FOLLOWING upon the article last week, which concerned the general character of labor political machinery, it is well to state the reasons for some of this growth and the educational necessities with which this is concerned.

We are apt to forget that from time immemorial the great educational factor has been the spur of necessity. For the large majority of people, industry—that is, the production and distribution of commodities—has been the only important education. In the days when the home was the great industrial center it was naturally the great center of education and when the hand worker did the whole of the work upon a product the apprenticeship education in the manufacture of that product was a strictly applied and useful education. Both these factors, the home and the apprenticeship system, taught the child the useful objects of life, the necessity for skill, the importance of judgment and permitted the play of the various faculties with considerable freedom in the development of these constructive requirements.

Moreover, this education was in agreement with the character of the social organization, so that the understanding of the individual in respect of the social organization was pretty complete.

Furthermore, the social standing of the producer was determined very largely by the skill and quality put into the product and the probity of his transactions in connection therewith, so that the simple social organization constituted a moral check upon the production character which formed a fairly stable moral basis in the education of the individual worker.

Since the introduction of the factory system, the education has been separated from industry and from the home. The things which the child learns in school have no visible connection with industrial life, and consequently, they have little or no effect upon either the industrial understanding or the industrial morals. The home has ceased to be important as an educational factor and the surroundings of the home have no visible connection with the industrial values nor with the educational requirements.

Neighbors do not judge each other by the skill, quality or probity of their industrial transactions, for these industrial transactions may be widely separated and concern entirely different processes. The business value of good workmanship, good quality and decent production value in prices, are not taught in schools and they do not become visible to the ordinary man in his connection socially or industrially with the processes with which industry is concerned.

The former education was valuable in that it agreed with the requirements of the social organization and brought the understanding of the individual worker within measurable relation to his social surroundings. The intimacy of the production and distribution transactions provided a social check upon the morality of these transactions. These things are no longer possible under present conditions. The primary school education is of general value in preparing children with some of the fundamental equipment of knowledge. It has no relation to industrial requirements and its relation with the requirements of the social organization is very slight. It gives little freedom for the exercise of the different faculties, for the development of the judgment and the social and industrial organization has grown so complex in the mean time that the education received by the ordinary citizen is of little value in preparing them to play a part in the proper development of this intricate civilization.

The important point to be considered here, however, is the absence of any moral education in the respect of industry in the present complex methods of life. As we have said, in earlier times the skill and quality of the work produced by the individual worker was known to his neighbor and affected their transactions with him, so that they had an intimate relation to his social standing.

Similarly, the transactions were between neighbors, and the reaction from these transactions was sufficiently visible and intimate to provide some moral check upon their character.

Neighbors are neighbors socially and nothing more in these days; to complete the processes of production in which they are concerned it may be necessary to follow the materials far enough over half the surface of the world. The transactions which they are responsible for in business have no connection with their social friendliness as neighbors, and therefore, the checks which automatically established themselves under the old régime have been removed.

The modern worker has no training in industrial morals, and he does not apply his moral understanding to his industrial activities. In his industrial world, there are no intimate industrial neighbors to whom he owes obligations of friendship and a fair measure of square dealing, business is transacted over such a wide area and the part played by the individual is so small that the individual worker is concerned only with one infinitesimal portion of the job of producing products for people. It is this which makes the competitive warfare between

industrial units of such a ruthless character that it finally demands combination, and it is this which makes the continuous warfare between capital and labor equally ruthless.

If the power continues to accede to the worker in this conflict between classes composing industry, it is to be expected that he will use this power as ruthlessly as the power was used by the manufacturer at a somewhat earlier period and is still used by some types of manufacturing minds.

Labor unions are constantly demanding a square deal from the manufacturer, and the manufacturers are constantly insisting that they do not secure a square deal from labor. It is impossible to arrive at any agreement as to what constitutes a square deal until there is mutual recognition of the individual responsibility and this is a moral matter. It is obvious, for instance, that the moral idea of the clothing manufacturer who said he had no obligation to take the goods, because the price had gone down, although he had ordered them and they had been manufactured for him, is an entirely different moral idea from that which impels another man to work ten years to pay off business debts which could have been escaped legally by bankruptcy proceedings. It is not in the least likely that these two men could come to any agreement as to what constitutes a square deal.

Similarly if the worker believes that he is entitled to limit production, to get as much pay as he can, to enforce shorter hours and to seize all the advantage, and the manufacturer believes that he is entitled to get his labor as cheaply as possible, to make them work as long as possible, and to make them proceed as rapidly as he can without respect to any other factors, there is little hope that these men will come to any solid agreement as to what is a square deal until they have educated each other or been educated by force of outside conditions.

The only way that the social organization manages to get together and live with increasing comfort without the continual strife of family feuds, class riots and tribal warfare, is by the recognition that each individual has certain moral obligations to the other individuals of a community or a nation, and that these moral obligations are so important that they must be observed by all individuals, any disturbers being promptly dealt with for the protection of the general organization.

The only way that modern complex business organization can get together, eliminate the class warfare, speed up its production and proceed in its progress without continual difficulty, is to determine upon some of the moral obligations which workers and employers owe to one another which industries owe to one another and which industry and government owe to one another.

This brings us back to the point which was made in the beginning of this article that industry for the large majority of people is the great educational factor. It is industry which must work out for itself the necessary moral basis which is required by the necessity for co-operation. It is industry which must work out the educational development, so that this moral basis may be understood and constitute the foundation of confidence that is absolutely necessary to increase progress in this interdependent state.

The greatest work which has been done by the manufacturers who have been sufficiently courageous to tackle the human problem, has been the development of a better understanding of what constitutes mutual responsibility, and it is this work which is the most important work before industry in the next generation.

Workers and the Management

AN interesting light was thrown upon the attitude of the workman toward scientific management by Dr. William R. Leiserson, chairman of the Labor Adjustment Board, Rochester Clothing Industry, in a recent speech before a conference of the Taylor Society. Dr. Leiserson pointed out that it had taken a long while for exponents of scientific management to convince the managers of manufacturing plants of the efficacy of their system. Much patient explanation and thorough demonstration were necessary before the result was finally accomplished.

Once executives became sold on the idea of scientific management, however, they began enthusiastically to install it throughout their plants with the full authority of the economic forces behind them. The establishment of scientific management methods meant in many cases a very distinct change from the way in which things had been done before.

Every human being is opposed to change; he involuntarily reacts in opposition to it when first suggested. Consequently it was not at all strange that workmen resisted the sudden installation of scientific management methods. These same managers, whom it had taken years to convince of the usefulness of scientific management, immediately insisted that the workmen were ignorant, backward and pigheaded when they did not accept at once and with enthusiasm the progressive measures of scientific management.

The ideas expressed by Dr. Leiserson bring out a rather fundamental difficulty in the methods of managers in dealing with employees. The chief object of management is to get the thing done, but managers too often are prone merely to assert their authority instead of seeking the most effective way of accomplishing their end. Although the difficulty of selling ideas to workmen may retard the progress of the first installation of new methods of procedure, the saving made by the co-operation of the men when they understand the reason for the change, far more than offsets the loss caused by a slight delay in the first place.

AN additional volume of its foreign commerce series, entitled, "Our South American Trade and Its Financing," has just been published by the National City Bank of New York. Frank O'Malley, the writer and assistant cashier of the institution, has produced a concise but comprehensive volume that should interest all exporters.

THE British Secretary of the Department of Scientific and Industrial Research announces that a license, under section 20 of the Companies (Consolidation) Act, 1908, has been issued by the Board of Trade to the Scottish Shale Oil Scientific and Industrial Research Association, which has been approved by the Department as complying with the conditions laid down in the Government scheme for the encouragement of industrial research,

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907, and The Horseless Age (semi-monthly) May, 1918.

Building Truck Bodies

COMPLAINTS from practically all sections of the country of dealers' losses sustained through delayed deliveries due to the short supply of motor truck bodies and equipment suggest that the industry may be forced eventually to interest itself more directly in body work. When dealers carry chassis inventories anywhere from six to twelve weeks, waiting for bodies to be built for trucks already sold, there is a slowing up in the process of merchandising which cannot be overlooked by the manufacturers of trucks.

In the larger centers of population truck body and equipment building plants have been developed to quite a satisfactory degree, but even here delays are too frequent and too long drawn out for good business. In small towns and rural sections there are few, and in some cases, no body building facilities, and the dealer must do business by mail with a maker some distance away and then drive the chassis there for equipment installation, a costly process. Truck manufacturers to a certain extent, of course, are building body equipment and when vehicles are driven away from the factory the dealer usually buys them complete, but where long distance shipments must be made by rail bodies are generally regarded as too bulky to be shipped economically, and the chassis alone is taken. The dealer in a truck whose manufacturer builds chassis only, of course, has no choice and must remain in the class of merchandisers seeking equipment outside the automotive manufacturing field.

If trucks are to be marketed in the quantities contemplated by the manufacturing interests there must be more body building and it must be scattered throughout the country so as to serve truck dealers in their home territories. Independent capital naturally will go into the business as the manufacture of trucks develops, but will it be available fast enough to meet increased chassis production unless there is stimulation from the industry itself?

There is an economic wrong, with two victims, when a truck purchaser has to wait for weeks or months to put into service a unit of transportation which his business needs and when a dealer has to stand carrying charges on the chassis over the same period.

It looks like an opportunity for the truck industry to interest the investing public and progressive business men in the growing demand for equipment products. Intelligent propaganda will be necessary and it should be started now, and not after augmented truck production has made the situation even more distressing than it is at present.

The Manufacturer's Opportunity

AN over-supply of labor is far from furnishing the ultimate answer to the labor question. During the recent labor shortage, some manufacturers looked to the importation of unskilled labor from Europe as the solution to our labor problem. They believed that the solution consisted chiefly in getting so many men for every job that each individual would work harder because he feared losing his job.

That situation has come about to some extent at present. It has come a good bit sooner than was generally expected in the automotive industry. Recent reports, which indicate that production per man is rising, seem to bear out the theory that perhaps nothing more was needed than a little fear of joblessness in the minds of workmen.

With the immediate labor situation easing up somewhat, less talk is heard among manufacturers concerning labor problems. The fact that labor is easy to get has caused the labor question to cease to be a live one in the minds of many employers. With a few, perhaps, it is alive in the sense that an attempt will now be made to pay labor back for affronts, fancied or real, received during the last five years.

If either of these attitudes—either the attitude of indifference or that of active opposition—becomes general, a permanent harm will be done to the productive possibilities of the automotive industry. The present situation offers an unusual opportunity to the

manufacturer to build up an active spirit of co-operation and productive energy among his employees that will make for lessened turnover, higher production and a more stabilized organization.

It has been pointed out in AUTOMOTIVE INDUSTRIES in the past how difficult it is to build up a good spirit between management and employees when a strike or labor trouble has recently occurred. Although extremely necessary during recent years, the task of building up such a spirit has not been an easy one, and the situation has been so critical from the standpoint of labor supply that experiments were, perhaps, hard to make.

Now the manufacturer is in a position to choose an efficient force, to train his employees thoroughly for the work of his establishment, and to build up a good-will with every employee that will mean dollars in his pocket, as well as contentment and well-being for his workmen. In viewing the labor situation in the automotive industry to-day, an opportunity for development and achievement is revealed which far surpasses any similar opportunity for many years.

The Fuel Problem from the British Viewpoint

NO country probably has given such earnest attention to the motor fuel problem as has England since the war. It is there considered not merely an industrial problem, but a national one, and research and investigation are being carried on by committees appointed by the Government. The problem from the British standpoint consists not only in increasing the available supply and keeping down the price of motor fuel, but, if possible, to find adequate sources within the Empire.

Curiously enough, although the British Empire includes one whole Continent and substantial portions of every other, all the large sources of petroleum so far discovered seem to be outside the British domains, if we make an exception of the fields in Mesopotamia, over which a mandate has been secured since the war. British capital, backed up by the Government, is trying to make the best of the situation by securing control of all newly discovered oil fields, in Mexico, Venezuela, etc. But it would be a far more desirable solution of the problem if adequate sources of motor fuel for the Empire's needs could be found within the Empire itself.

As part of the work of the British Fuel Research Board, Sir Frederick Nathan recently made a report on the possibilities of alcohol as a motor fuel. It is essentially a summary of the present position of power alcohol and also considers other possible sources of motor fuel, insofar as their availability would affect the chance of alcohol.

Mr. Nathan is not very enthusiastic concerning alcohol, especially as regards the immediate future. We often hear the statement made that, provided proper legislation were enacted, immense quantities of alcohol could be produced from waste materials. Nathan asserts, however, that as far as the British Isles are concerned the amount of such waste material is negligible when compared with the enormous quantities of liquid fuel required. Growing plants rich in starch specially for alcohol production is out of the question in Great Britain, as these same plants are suitable for human food, of which the country now only produces sufficient for a week-end supply. In the tropical sections of the Empire there is plenty of land available and starchy plants could be grown quickly and in abundance, but the prospects are that with the high cost of plant, labor and transport the price at which the alcohol could be delivered in England would be prohibitive as long as gasoline is available at about 50 cents per U. S. gallon. Most of the products of the tropics sold in the northern countries are anything but cheap and alcohol from tropical vegetation would probably be no exception to the rule.

Nathan seems to think that the solution of the motor fuel problem, at least so far as Great Britain is concerned, lies in coal. As compared with the known sources of petroleum, the known deposits of coal represent an immensely greater store of energy. The annual production of coal in tons now is about twenty times as great as the annual production of petroleum.

It is pointed out in the report that we have learned to "sort out" the different constituents of coal and now derive from it gaseous, liquid and solid fuels. For motor transport, liquid fuels are naturally most convenient, but in the heavier forms of transport gaseous fuel may again have to be used, as it was in England during the war.

Much of the information contained in the report has a direct bearing on the fuel situation in this country. Not much dependence can be placed on waste materials and, when it comes to growing cereals for fuel alcohol production, there is not only the objection that up to now all the land under cultivation has been needed for raising foodstuffs, but in view of the high cost of labor and the rather involved processes the cost of production would certainly be much higher than the present cost of gasoline, on the basis of equal heat contents.

Coal and Motor Cars

A RECENT issue of an industrial paper devoted to the coal trade printed some exceedingly sarcastic sentences regarding the purchase of a railroad by the Ford interests to assure a supply of coal for the great transportation plant controlled by the Fords. The headline was "Survival of the Flivverest." The printing of this editorial is of interest because of its indication that the editor of the publication has not a proper appreciation of the transportation interests of the day. He seems not to have studied the great transportation service of the Ford products or he would realize that no greater economy of coal could be to-day than using it for the production of automotive vehicles, which are potential in relief of the general transportation tie-up, the prime trouble in the coal situation.

We would like to see the results of a comparison of the efficiency of the distribution of coal on railroad cars and of this same coal after it reaches the point where the distribution is dependent upon automotive vehicles.

Car Exports Show Vast 1920 Gain

Year's Total Almost Doubles 1919 Mark

Combined Car and Truck Shipments $165,961,709—June Shipments Drop

WASHINGTON, July 31—The expected high record of automotive export trade for any twelve months' period was revealed to-day in publication of the figures showing the trading for the fiscal year of 1920, which ended June 30. These were greatly in excess of the previous year and much heavier than for the calendar year of 1919.

Shipments of passenger cars for the year totaled 115,519, valued at $124,384,025, and of trucks 24,356, valued at $41,577,684. Comparison with the fiscal year of 1919 is given in the adjoining tables. For the calendar year 1919, the totals were 67,085 cars, valued at $73,650,427, and 15,469 trucks, valued at $35,385,069.

Exports for the month of June were announced at the same time. These showed a decline from the May figures. Car shipments were the smallest since February this year. No analysis of the reason for the decline was given, but it was apparent that much was due to seasonal causes and to the transportation situation.

Car shipments in June were some 2257 less than the record month of May. The June figures as well as those for the fiscal year are shown in the adjoining tables.

Exports of Automobiles, Airplanes, Trucks, Farm Tractors, Motorcycles and Parts for June and Twelve Previous Months

	June, 1919		June, 1920		12 Months Ending June 1919		12 Months Ending June 1920	
	No.	Value	No.	Value	No.	Value	No.	Value
Airplanes	4	$27,000	4	$28,700	51	$644,600	63	$459,394
Airplane parts	....	967,345	....	9,443	....	12,216,801	....	643,270
Commercial cars	1,767	3,935,211	2,697	4,216,502	12,921	33,233,485	24,356	41,577,684
Motorcycles	2,943	784,907	2,557	689,485	14,214	3,715,015	35,041	9,550,022
Passenger cars	7,879	8,325,563	12,733	14,486,362	41,291	45,852,705	115,519	125,384,025
Parts, not including engines and tires	....	45,618,287	....	7,429,188	....	37,218,783	....	66,290,667

Engines

	June, 1919		June, 1920		12 Months Ending June 1919		12 Months Ending June 1920	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobile, gas	4,249	$699,263	4,108	$673,619	28,445	$4,434,244	39,421	$6,070,449
Marine, gas	1,609	465,941	1,083	303,488	8,617	4,130,308	10,230	3,457,524
Stationary, gas	2,378	390,926	2,832	437,115	23,953	3,444.086	28,584	4,385,447
Tractor, gas	1,588	1,676,527	1,644	1,551,236	20,365	21,997,667	20,160	19,277,357
Total	9,824	$3,232,657	9,667	$2,965,458	81,380	$34,006,667	98,395	$33,190,777

Imports for June 1920 and Fiscal Year

	June, 1919		June, 1920		12 Months Ending June 1919		12 Months Ending June 1920	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles	10	$2,900	26	$47,591	88	$36,641	204	$305,020
Parts of (except tires)	....	3,830	....	115,864	....	37,622	....	738,367

British Trade Balance Gets Setback in June

LONDON, July 16 (*Special Correspondence*)—According to the American Chamber of Commerce in London, British trade returns for June just issued are not as favorable as those of the preceding month, when the value of exports created a record.

Exports declined by over 2 millions sterling, as compared with the previous month, whilst imports rose by over 4 millions sterling. Consequently the adverse balance of trade, which was 26 millions in May, has risen to 34 millions sterling in June.

There was also, says the American Chamber, a substantial fall of over 2 millions sterling in imports of raw materials. Wool is down by 1 million and cotton by ½ a million, but the value of manufactured goods was 4 millions higher than in May. Exports of cotton goods show a decline of over 1 million sterling and iron and steel over £437,000. Coal shows a continuous decline and exports for June were far below those of May.

Imports of motor cars are extraordinarily high, 4518 vehicles being imported in June alone, the total for the first six months of the year being over 18,000. Iron ore imports increased by nearly 1,000,000 tons during the same period, whilst cinematograph films reached 5 million linear feet for the month and over 33,000,000 feet for the half year.

A return just issued, says the American Chamber, of the United States foreign trade for May, shows that during that month exports increased by $55,000,000 and imports by $64,000,000 as compared with April. It would be interesting to many people to compare trade returns for America and Great Britain month by month, but whereas British returns are available within a week or ten days after the end of the month, the American returns are usually a month late.

EXPORT MANAGER DIES

SPRINGFIELD, MASS., July 31—Joseph Austin Selwitz, assistant export manager of the Bosch Magneto Co. of this city, died of heart failure while bathing at Crescent Beach, Block Island. He had recently passed a medical examination for the aviation service.

GERMAN AIR SERVICE RESUMES

WASHINGTON, July 31—Large purchases of American gasoline has enabled the aerial traffic companies of Germany to resume aerial service, according to dispatches from the American commercial attaché. More than fifteen million marks have been appropriated by the Government to subsidize air navigation on condition that the newly established lines carry mail. The Department of Commerce has been advised that the American aircraft manufacturers are needlessly alarmed over reports of dumping of French airplanes in this country. There is no such intention.

VULCAN STUDIES MARKET HERE

MONTREAL, July 30—Walter E. Walker, director and general manager of the Vulcan Motor and Engineering Co., Ltd., a branch of the Harper-Bean combine, arrived in Montreal a day or two ago, to bring this British motor truck to the notice of Canadian manufacturers, dealers and financiers. The company's ultimate object is the establishment of a branch factory here for the manufacture of Vulcan trucks. The present Vulcan establishment at Southport, England, according to Walker, employs 2500 hands and produces 100 to 150 trucks per week.

Akron Continues Force Depletion

Reduction of 38,000 Estimated Since June 1—Tire Prices Firm

(By a Staff Correspondent)

AKRON, July 31—The cut in working forces, begun by some tire companies as early as last May, continues at about the same rate as during the last two weeks, while certain plants, heretofore affected but slightly, are beginning to cut down. A conservative estimate, based upon an investigation of the most important rubber plants, places the number of men thrown out of employment since June 1 at about 38,000. This is the result of a cut in working forces averaging from one-third in some plants to two-thirds in others.

Large stocks of all kinds of tires are on hand in the plant warehouses while the working hours have been reduced generally. Goodyear is running all three shifts on a five-day a week basis; Firestone is operating but two shifts, as is Miller. Goodrich is still operating on a full time three-shift schedule. No basis can be found for reports that tire prices will be cut by any of the large manufacturers.

Despite optimistic statements by executives of some concerns, it is impossible to find any practical signs to indicate that the low point has been reached in regard to curtailment. So far as can be learned no company has ceased laying off men. The contention is made in some quarters that few actual layoffs are being made, because the normal labor turnover eliminates enough men every day to render layoffs unnecessary. It is asserted the employment departments simply have ceased hiring.

Turnover Not Desirable

In some cases this is true but such a statement somewhat confuses the facts. Labor turnover, involuntarily so far as the company is concerned, is not usually a desirable thing. Every attempt is made to reduce this. Thus, if Akron plants had been successful in eliminating it, actual layoffs would be necessary at the present time. In most cases, moreover, the normal turnover of from 200 per cent to 250 per cent a year has not been sufficient to meet the sudden demand for curtailment.

The railroad situation in Akron is better than it has been for some time and little or no difficulty is being met in shipping material in and out. No additional difficulties in securing raw materials have arisen, so far as can be ascertained.

Accurate production figures for the present time are not obtainable at any of the leading plants, but the large percentage of reduction in forces indicates in a general way what the drop in production has been.

Men who have been associated with the rubber business in Akron for many years say, however, that the present falling off in production and working forces is not really as large in percentage as the normal summer slump before the war. At that time, they say, such a decided slump came each summer. It was expected and consequently excited no comment. Since the war, however, the upward climb has been so rapid and unbroken that this first break is causing more attention than it really warrants.

Rigid Curtailment Rules

There is little question, nevertheless, that practically every tire manufacturer in Akron is pursuing a policy of rigid curtailment. Not only the manual workers but the office men have felt the force of the blow. Many large departments have been cut to mere skeletons while others have been eliminated altogether. So-called "development" departments have suffered worst. The personnel is being cut down to the lowest possible working minimum.

There is a marked reluctance among tire company officials to talk for publication at the present time. There may or may not be significance in this fact. P. W. Litchfield, factory manager of Goodyear, stated the other day to the Goodyear employees:

"It is probable that the low-water mark in tire production has been reached and that it will stick at this point until the tire surplus is absorbed and the plant can start to swing upward again."

Investigation fails to show many actual facts to corroborate this view.

Harvey Firestone is absent from this country, while John W. Thomas, chairman of the board of directors at Firestone, stated that he had nothing to say for publication.

Goodrich is continuing work on some $10,000,000 worth of buildings with a view to later increased production, but immediate increases are not anticipated as curtailment is taking place.

In spite of numerous unfavorable indications just at present, a tone of considerable confidence pervades every concern. Only one small firm has failed. The large companies all are in a strong financial position.

Low Water Mark Reached

P. W. Litchfield, vice-president and factory manager of the Goodyear company, recently made a statement before the Industrial Assembly in which he declared it was probable the low water mark in tire production had been about reached and that it would stick at the present point until the tire surplus was absorbed and then the plant could swing upward again.

The Goodyear company asserts that increased production depends very largely upon the ability of the automobile manufacturer to sell his product. It predicts that September will see an improvement in conditions. In the meantime it is pushing its mechanical goods business to the limit. The Goodyear company's financial requirements have been met by the sale of $26,000,000 of new stock.

G. M. C. Prepares for Depression Period

Expect Earnings Shrinkage for Balance of Year—Delays Big Development

NEW YORK, Aug. 2—Banking interests which recently acquired an interest in General Motors feel no apprehension over the present industrial outlook. Earnings of the corporation for the second quarter were substantially larger than the net profits of $19,754,000 after Federal taxes for the first quarter, according to preliminary estimates. It is expected, however, that the remainder of the year may show a shrinkage in earnings. Discussing the outlook, a representative of one of the banking houses now associated with the company, said:

"When we interested ourselves in General Motors we took into consideration the fact that there might come a time when a great deal of pessimistic talk would be circulated about the automobile industry and that its business might temporarily suffer thereby. We have not changed our opinion in the slightest. It is useless to attempt to buck this tide of pessimism and the surest way to end it is to let it spend itself.

"People find it hard to believe that there is still a great shortage of motor vehicles in the country as a whole, because we hear so much talk of cancellations of orders for automobiles. It is true that in some sections there is no demand, but in other localities dealers cannot obtain enough cars to fill their requirements. This condition is difficult to adjust because of the transportation tieups.

"For the time being no attempt will be made to carry forward the development of General Motors on a large scale. The company's existing facilities will be gradually augmented by the completion of new plants now under construction, but no large new additions will be undertaken.

"General Motors will have no difficulty in disposing of every motor vehicle it can produce, but while there has been a better freight car movement recently, the demand for cars for crop movement may affect inflow of raw materials, thereby curtailing production and earnings."

HUPP TO INCREASE EXPORTS

DETROIT, July 31—The Hupp Motor Car Co., which has been devoting some 25 per cent of its production to export purposes in the past, will probably increase this to 33 1/3 per cent in the near future. President Charles D. Hastings stated to-day that the export demand is large enough to take the entire output of the present factory, and the only reason for limiting the export output is to meet the demands of domestic dealers.

No Easing Evident in Strain on Credit

Week Brings Little Change in Situation—Business Slack in Many Lines

NEW YORK, Aug. 3—The past week has brought little change in the general financial and transportation situation. While the position of the Federal Reserve banks has shown some slight improvement, there has been apparent no easing of the credit strain. Banks protest vigorously that they are not in a position to extend longer lines. They assert that liquidation has scarcely begun and that all they have accomplished thus far has been to check expansion.

A statement made in this city by W. P. G. Harding, governor of the Federal Reserve Board, in which he said there had been a gradual improvement in the credit situation, was hailed gleefully by Wall Street interests as indicating that the worst was over. Their rejoicing seemed to be somewhat premature, however, for the Street has found money for speculation no more plentiful.

Automobile manufacturers, especially the small ones, are having their hands full financing themselves, but the larger companies seem to be in a more satisfactory position. There is apparent, on the other hand, a willingness on the part of banks in most parts of the country to be a bit more liberal and reasonable in dealings with dealers. Those who are well established, particularly in the smaller cities, are finding it possible to get the funds they must have to finance the business they now have.

Business is slack in nearly every line of manufacture, and many plants either are running on part time or are closed altogether because of lack of orders. This is especially true in textiles, boots and shoes. Buyers for retail establishments are holding off because of price uncertainties and are reluctant to purchase on what they believe will be a falling market. They are not perturbed, apparently, by warnings that if they do not hurry their stocks will be exhausted.

Crops Open Opportunities

The brightest spot on the horizon is found in the splendid crop reports. Prospects for crops of all kinds are excellent and the yield will be vastly larger than was promised early in the year. As a consequence, the great crop growing sections are inclined to be optimistic, and they seem to offer the best fields in which to seek buyers for any kind of commodity.

The most important event of the week, so far as the railroads are concerned, was the increase in rates authorized by the Interstate Commerce Commission. So far as automobile makers are concerned, they simply will "absorb" the increased freight charges on top of their present classification. Rates on passenger cars in the eastern territory now are 11 per cent of the regular first class rates. In the rest of the country they come under the first class. In the western territory trucks are in the first class, while in the South and East they are in the second. Horse drawn vehicles come under the second class all over the country.

The carriers now are talking about the purchase of new equipment, but it is reported they first will devote their attention to rejuvenation of the rolling stock now on hand. This may ease the situation somewhat, but if the assertions of the railroads, made before the rate increase was granted, are to be believed, there can be no real relief until new equipment is provided.

There has been a slight easing of transportation difficulties in some sections, but it is considered only a lull before roads get fully into the throes of the crop movement. It undoubtedly is due in large measure to the heavy curtailment in manufacturing which has come with midsummer for various reasons.

Car Shortage Ties Up Southern Road Building

NEW ORLEANS, Aug. 2—Shortage of gondolas and flat cars on the railroads is slowing down road work in the South almost to a standstill and seriously impeding the marketing of unusually heavy crops by motor truck. It is impossible to get gravel, sand and shells for the construction of these roads as long as the car shortage exists, and the Motor League of Louisiana, with the Louisiana-Mississippi Automotive Trades Association, has taken up the question of more cars with the railroads operating in Louisiana and Mississippi.

Virtually all the available gondola cars have been sent to the coal mines by the railroads in an effort to avert a coal shortage this winter. Meanwhile, roads and motorists, crops and trucks must wait, as there is little prospect that the efforts of the two associations will accomplish anything.

PARAGON NEARS PRODUCTION

CLEVELAND, Aug. 2—In spite of transportation delays, the Paragon Motor Car Co. is rapidly assembling machinery for the first series of demonstration cars. It is hoped to have them assembled and running by Aug. 15. The factory is expected to be complete by the time the company is ready to get into production. Charles E. Bailey is general sales manager of the company and Vance Surmo is organization manager.

SEEKS BELGIAN SALES RIGHTS

NEW YORK, Aug. 2—A. H. Snyers, 10 Place St. Denis, Liége, Belgium, desires to represent American manufacturers of automotive accessories in Belgium. He would like connections with makers of tires, spark plugs, motorcycles, fire extinguishers, etc.

Standard Parts Has Plan for Financing

Will Issue $8,000,000 Five Year Notes and 80,000 Shares of Common Stock

CLEVELAND, Aug. 2 — Permanent plans for financing the Standard Parts Co., of this city, provide for the retirement of $6,000,000 7 per cent notes maturing Sept. 5, 1920, and the issuing of $8,000,000 five-year first mortgage collateral 8 per cent gold notes and 80,000 shares of common stock.

The notes are to be secured by a first mortgage on the fixed assets of the company, including its machinery and equipment, and by a pledge of the common stock of the Bock Bearing Co. The notes will be dated Aug. 15, 1920. The common stock to be issued is without par value and will be provided for in a reorganization under the laws of Ohio.

The number of common and preferred shares authorized will remain as at present; outstanding common stock of $100 par value will be exchanged share for share for new common. The new preferred will differ from the old only in a modification to defer redemption requirements during the life of the notes.

Statements from officials of the company show it to be enjoying prosperity and indicate that under terms of this financing, the company will be fortified for increasing production. As compared to losses sustained prior to the incumbency of the present management, operations for the four months from March to June inclusive produced a profit of $788,021. Losses in January and February amounted to $137,000.

Inasmuch as returns over the four months' period have been increasing, position of the common shares is increased correspondingly. According to the balance sheet of June 30, adjusted to include this financing, the assets value back of the common stock amounted to in excess of $40 a share. Of a total authorized issue of 250,000 shares of common, 227,000 will be outstanding on completion of this financing.

To Resume Dividends

The management expects that payments of deferred dividends will be resumed by Jan. 1, 1921. Since entering control in February, the new management has effected important economies, including saving at the central office now running at a rate of more than $300,000 per annum.

The Standard Parts Co. has been organized into five main divisions, namely, the Standard Welding, with one plant at Cleveland; the Perfection Spring, with plants at Cleveland, Canton and Pontiac; the Eaton Axle division, with two plants at Cleveland and one at Cincinnati; the Bock Bearing, with plant at Toledo, and the Vehicle division, with plant at Connersville, Ind.

Cameron Upheld in Suit on Engine

Holmes Manufacturing Company Restrained from Competition Pending Termination of Case

BRIDGEPORT, CONN., Aug. 2.—A temporary injunction restraining the Holmes Mfg. Co. from manufacturing or selling an air cooled engine embodying the essential features of the product of the Cameron Motors Corp. has been granted Cameron by Judge Frank D. Haines, in the Superior Court of Fairfield County, Conn.

In granting the injunction Judge Haines pointed out that no attempt is made to determine the merits of the case now pending, which involves the right of the Holmes company to break a contract for 5,000 engines and put their own product on the market in competition. He also called attention to the fact that the Holmes company admits its purpose to model the new engine so closely after the Cameron product that the tools and materials which had been provided for the manufacture of the Cameron could be used largely in the manufacture of the new one.

In his memorandum Judge Haines says: "It is not proposed in this proceeding to determine the defendant's right in general to design a motor of its own, but the plainest rules of equity and fair dealing require that no advantage be taken of the information furnished the defendant by the plaintiff for the building of the plaintiff's motors. So long at least as this relation between the parties exists, the defendant should be denied the right to enter into destructive competition with the plaintiff's product, or substitute their own motor for the motor they agreed to manufacture for the plaintiff."

OHIO RIVER SHIPMENTS GROW

WHEELING, W. VA., July 31—Since it is no longer possible to ship automobiles in open-top cars there has been a material increase in the number of cars and trucks shipped by water. That is particularly true as to the Ohio River, where during the last few weeks packets have been transporting one or more automobiles. Only a few days ago one towboat passed down the Ohio with a tow of barges, one barge being loaded with 120 White trucks. Part of the consignment was for dealers at Memphis and part of the consignment for dealers at St. Louis.

R. & V. KNIGHT MAKES CHANGES

EAST MOLINE, ILL., Aug 2—H. A. Holder, Boston, director of the Root & Vandervoort Eng. Co., has been made vice-president of the organization and will assume an active part in direct management of the industry. Holder is an industrial engineer of extensive experience and wide reputation. Announcement of his association in the company came with decision to organize departments devoted to manufacture of automobiles and motors in two general manufacturing divisions. A. T. Miller, general superintendent of plants devoted to the R. & V. Knight automobile manufacture, is now in charge of the entire automobile division. Eugene Gruenwald retains his place in charge of the commercial motor division.

Jackson Spring Now Reynolds Company

JACKSON, MICH., July 31—The Jackson Cushion Spring Co. has changed its name to the Reynolds Spring Co. The company's business for the last six months has been the largest in its history, and the business of the month of June was the largest for any one month. July is expected to exceed June. The stockholders voted that the authorized preferred A, B and common stock be increased so that an application to list the stock might be made to the New York Stock Exchange and that new certificates, as are required by the New York Stock Exchange, be issued. The American Exchange National Bank of New York is made transfer agent and the American Trust Co. of New York, registrar of the stock. Up to July 1, 1919, the Jackson Cushion Spring Co. was owned by five people. When the present owners of the controlling stock entered, the old directors were asked to continue. W. R. Reynolds was elected president by the directors, Watson R. Smith to succeed him as first vice-president, and Ralph L. Wilcox as second vice-president.

High Rent May Compel Cleveland to Drop Show

CLEVELAND, July 31—According to the present outlook, there will be no automobile show in Cleveland, this being the first break in the automobile show schedule in this city. The difficulty is in securing a building. For the only building available the owner demands a rent of $50,000 for a week and the association at a meeting yesterday decided that it would do without the show rather than pay this amount. As an alternative it is planned that dealers will decorate their salesrooms and hold an automobile display week on motor row in place of the customary exhibition.

LONG LEASES FREMONT PLANT

DETROIT, July 31—The Long Mfg. Co. of this city, makers of radiators, will build cast tank truck radiators at Fremont, Ohio. The Fremont Foundry Co. has leased to the Long Mfg. Co. a large building adjacent to the foundry building, which is adapted to this work. This arrangement puts the cast tank radiator plant in close touch with its source of gray iron castings, as the Fremont Foundry Co. has hitherto supplied these castings and will continue to do so under the new arrangement.

Absorption Sought for Empire Axle

Watson Products to Take Over If Creditors Accept Stock Payment

DUNKIRK, N. Y., Aug. 2—Creditors of the Empire Axle Co., Inc., have been asked by Levi S. Chapman, a Syracuse attorney, to consent to its absorption by the Watson Products Corp., of Canastota, N. Y. The basis of the proposition is to give co-operating creditors one share of common stock in the Watson company in exchange for each $100 of indebtedness of the Empire company, all claims of less than $100 to be paid in cash.

Chapman announces that unless the Empire company can be kept together as a going concern it will be possible to pay the general creditors only a few cents on the dollar as the entire inventory of $384,826 would be of little or no value and the shop equipment which cost more than $75,000 would be of no more worth than junk.

In any event, Chapman says, it will be necessary to apply at an early date for a receiver in bankruptcy. It is his purpose to give as many creditors as may so desire an opportunity to co-operate with him, leaving to the others such dividends as they may receive in a bankruptcy proceeding. He adds that the proposal he makes is entirely satisfactory to the Brown-Lipe-Chapin Co. and the Syracuse Supply Co., both large creditors.

The business of the Empire Axle Co. was so promising last year than an addition to its plant was built and equipped at a cost of $125,000. A few months ago the business took a turn for the bad, according to Chapman's letter to the creditors. Orders on hand had increased until they totaled $1,500,000 and materials were contracted for to fill them.

July Inventory Heavy

The inventory was growing larger and larger while transportation difficulties were increasing. It reached $384,828 on July 1. On top of the unbalanced inventory came requests from nearly all customers for delays and cancellations, "due entirely to conditions prevailing in the automobile line.

The total tangible assets, including inventory, are placed at $704,589 and the liabilities at $561,950, including $443,731 in notes and accounts payable and $112,000 in a mortgage on the plant.

The Watson Products Co. is said to have net assets over liabilities of $1,000,000. During the present year its preferred stock has been increased from $750,000 to $1,000,000 and its common from 2500 shares of $100 par value to 15,000 shares of no par value. Last month it sold $500,000 of sinking fund bonds, giving additional working capital. The company never has failed to pay dividends on its preferred stock.

Lack of International Club Relations Works Injury to American Cars Abroad

Tourists Held from Usual Privileges—No Cognizance Given to Records

PARIS, July 10 (*Special Correspondence*)—As an automobile power, the position of the United States in Europe is no better than that of Germany. There exists in Europe an International Association of Recognized Automobile Clubs comprising every European nation, except Germany, which nation was eliminated on the outbreak of war and has not been reinstated.

One of the most important advantages obtained by this grouping of national automobile bodies is that automobile travel between European countries is simplified, so that an Englishman, for instance, after depositing customs duties with his home association, can travel in every country in Europe with his home license plate and without any other formality than the stamping of his papers as he crosses the frontier lines.

America has no such privilege, for although the Automobile Club of America occupies a position on this international association, the United States does not reciprocate the European facilities, and the American automobile owner can only travel through Europe with an international pass given by courtesy of France or England. In order to do this he has to take off his home numbers and register his American car as a European machine.

Another disadvantage of this outlaw position is that American speed records are not recognized in Europe. A few weeks ago the International Association of Automobile Clubs met in France and officially accepted the world's record at 124.10 miles an hour, put up by a German car in England. Ralph De Palma's work for Packard is considered as nonexistent and Tommy Milton's high speed on the Duesenberg has no official recognition in Europe. The records at Indianapolis, although the timing there is infinitely superior to anything known in Europe, have no standing.

No Credit for Records

The danger of this situation is that the holder of American records can claim no credit for his performances in Europe. If he attempted to advertise these records the holder of the lower but officially recognized speed performances would have the right to insist on his advertising being withdrawn.

This situation arises from the fact that the American Automobile Association, which has control of racing in the United States, has no standing in Europe and does not appear to ever have attempted to assert its importance away from home. So far as Europe is concerned, the only body in America en-

(*Continued on next page*)

A. A. A. Admits Shortcomings of Present Situation—To Work for Reciprocity

WASHINGTON, D. C., Aug. 1—"While racing relations between the United States and at least one European country are somewhat out of joint owing to automobile organization methods followed on the other side, the situation does not affect the practical arrangements which have to do with the average American who indulges in touring abroad," said Executive Chairman A. G. Batchelder at the American Automobile Association headquarters in the Riggs Building.

"When the American Automobile Association was formed at Chicago, in March, 1902, the Automobile Club of America contended for the establishment in America of the European method," explained Batchelder, "which, briefly, elevates the club in the largest city to a position superior to the other clubs and makes them more or less subject to its authority. This plan was not acceptable to the representatives who assembled in Chicago eighteen years ago, and so in the A. A. A. all clubs were placed on an equal basis, their voting strength being regulated by their membership totals.

A. C. A. Severs Relations

"Subsequently the A. C. A., owing to a difference on legislative matters at Albany, withdrew from the New York State Automobile Association, and thus automatically severed its membership in the A. A. A. Gradually the A. A. A. extended its operations to cover the whole country, until now practically all clubs of any importance, with a couple of exceptions, are now included in it. Through its contest board the A. A. A. exercises a control over all automobile competition.

"Just previous to the war period, Chairman Richard Kennerdell of the contest board notified the Automobile Club of France that since the A. C. A. had withdrawn from any participation in racing affairs in the United States thereafter the A. A. A. was prepared to deal directly with it and the other foreign clubs. As long as the A. C. A. was a part of the A. A. A. there was no marked objection to communicating with the foreign clubs through that channel. Since there was no competition of any magnitude on either side during the war, the question of dealing directly with the Automobile Club of France or through the old A. C. A. point of contact was immaterial.

"It is now the intention of Chairman Kennerdell to direct another letter to the Automobile Club of France, apprising it again of existing conditions in this country, for it certainly is illogical for the A. A. A. to continue to transact foreign racing matters through the excellent New York club when it is no longer a part of the national organization. As to the acceptance or non-acceptance of American records by the foreign clubs, no great value attaches, for the simple reason that the American firms now participating in racing do not export many cars abroad, while the drivers who come here from the other side are tempted by the generous purses offered at Indianapolis and not because of contracts existing with foreign automobile manufacturers.

Touring by Courtesy

"As to Mr. American when he goes abroad for touring. Within the past month there has been organized in Europe as a successor to the old international touring body, of which the A. A. A. was a member, what is now known as the Alliance Internationale de Tourisme, usually referred to as the I. T. A. The American member is the American Automobile Association, while Great Britain is represented by the Automobile Association and Motor Union of Great Britain and Ireland; France by the Touring Club of France and also the Union Velocipedique Francaise; Belgium by the Touring Club of Belgium; and Italy by the Touring Club of Italy. Other bodies may subsequently be admitted, but at the moment the associations named are the active ones.

"It is unfortunately true that since the United States is not a participant with the other countries in the issuing of what is known as the international plate of identity, which shortly will be supplemented by a somewhat similar arrangement having to do with customs duties. However, it is the expectation of the American Automobile Association that in the next Congress it will be able to bring about the passage of the Sweet-Pittman automobile reciprocity bill which included the giving of authority to the Secretary of State to conclude the necessary negotiations with the European countries.

Sweet Bill Gives Powers

"At present the A. A. A. arranges for this by passing its member along to the Automobile Association and Motor Union in Great Britain and to the Touring Club of France with headquarters in Paris. The Sweet bill would give to the Secretary of State the necessary authority which does not seem to exist, unless it can be covered by special treaty arrangements, which plan is now under consideration by the State Department."

NIXON STUDIES BUSES ABROAD

NEW YORK, Aug. 2—Lewis Nixon, public service commissioner, sailed for Europe on the Aquitania to study the motor bus question as it relates to the use of these vehicles to supplement street cars. He believes buses will be used much more extensively in this country in the next few years. Nixon will visit principal cities in England and the Continent, where buses have an important part in transportation to observe the system employed.

Tire Exports for May

COUNTRIES	Casings	Inner tube	Solid tires
	Dollars	Dollars	Dollars
Austria	56,061	8,645	.....
Belgium	86,073	11,094	.....
Czechoslovakia	21,334	1,812	.....
Denmark	91,279	12,864	20,523
Finland	27,281	10,839	26,856
France	222,064	3,721	.....
Germany	99,038	20,116	.....
Gibraltar	1,108	.....	.....
Greece	43,159	10,097	.....
Iceland and Faroe Islands	675	90	.....
Italy	87,902	11,467	.....
Netherlands	112,653	9,868	4,044
Norway	179,873	7,753	29,606
Poland and Danzig	35,394	400	.....
Portugal	19,475	2,366	.....
Roumania	4,535	.....	.....
Spain	186,682	34,262	27,933
Sweden	339,095	66,686	32,690
Switzerland	57,907	5,258	.....
Turkey in Europe	12,152	142	254
England	317,041	10,665	10,000
Scotland	47,545	6,724	.....
Bermuda	.....	.....	337
British Honduras	222	475	.....
Canada	102,905	40,240	13,784
Costa Rica	539	5	.....
Guatemala	3,514	1,367	383
Honduras	2,392	599	1,465
Nicaragua	1,217	61	540
Panama	18,333	2,698	183
Salvador	6,632	1,431	36
Mexico	71,462	8,158	4,788
Newfoundland and Labrador	5,268	723	123
Barbados	1,805	228	.....
Jamaica	13,826	1,666	823
Trinidad and Tobago	16,114	1,769	1,868
Other British West Indies	3,671	333	460
Cuba	282,085	34,004	58,312
Virgin Islands of U. S.	1,047	207	.....
Dutch West Indies	1,427	166	4
French West Indies	689	82	.....
Haiti	2,834	660	444
Dominican Republic	23,756	3,904	2,961
Argentina	384,542	37,106	2,384
Bolivia	3,918	.....	.....
Brazil	215,042	21,479	7,955
Chile	61,503	4,024	3,932
Colombia	24,029	4,070	800
Ecuador	3,213	139	.....
British Guiana	1,428	277	604
Dutch Guiana	428	.....	.....
French Guiana	130	14	.....
Peru	13,241	5,841	1,506
Uruguay	169,097	12,996	1,520
Venezuela	15,045	5,583	945
Aden	2,217	144	.....
China	24,651	1,923	250
Chosen	.....	243	.....
British India	56,837	8,456	6,731
Straits Settlements	106,782	3,745	9,711
Other British East Indies	2,496	200	.....
Dutch East Indies	188,714	10,574	85,674
French East Indies	555	.....	.....
Hongkong	1,687	.....	.....
Japan	78,238	4,358	1,168
Siam	2,500	.....	800
Turkey in Asia	14,342	2,655	9,218
Other Asia	.....	.....	.....
Australia	73,380	11,149	7,354
New Zealand	130,982	7,987	4,194
Other British Oceania	725	774	.....
Other Oceania	486	32	.....
Philippine Islands	148,732	11,783	17,323
British West Africa	99,550	6,359	986
British South Africa	166,037	12,959	222
British East Africa	5,375	1,098	1,200
Canary Islands	332	.....	700
French Africa	6,058	588	722
Morocco	2,293	198	.....
Portuguese Africa	1,830	.....	.....
Egypt	15,593	1,733	.....
Total	$4,630,072	$512,132	$404,316

SEE NEED FOR RELATIONS

(*Continued from preceding page*)

titled to speak in the name of the American automobile movement is the Automobile Club of America. This club has no American speed records to put forward, for it has no connection with American racing. It cannot secure for Americans traveling abroad the facilities given to Englishmen, Spaniards or Chinese, for it only represents a group in an American city and not the motorists of the United States of America.

These matters were of minor importance when the American automobile movement was confined to the United States. Now that the industry has spread over the whole world, full recognition should be secured. It is undignified for an American motorist to travel Europe under a foreign flag, and an American car manufacturer should not have to apologize for his own records.

Harvester Workers to Share Big Bonus

Sixty Million Reserve Created to Increase Production and Efficiency

NEW YORK, Aug. 3—Action of the International Harvester Co. in setting aside $60,000,000 of its stock for distribution among its 40,000 employees is construed as a practical attempt by the management to increase efficiency and enlarge output. The annual distribution of shares will vary according to the size of the company's profits. This will be an added incentive to hard work on the part of employees. At the end of eight or ten years the plant workers will own approximately one-fifth of the stock, basing estimates on present capitalization, and such a minority holding usually is given representation on the directorate. Under the Harvester company plan of distribution the actual factory workers will receive a greater proportion of the shares than executives and office employees, because of the essential productive nature of their employment.

Stockholders of the company, at a special meeting held at Hoboken last week, ratified the proposal of the directors that the $60,000,000 worth of stock be distributed among the employees under an extra compensation and stock ownership plan open to all workers in this country and Canada.

The program calls for special disbursements each year, beginning Jan. 1, 1921, consisting of stock and cash. It is planned to divide annually an amount equal to 60 per cent of the company's net profits in excess of 7 per cent on the invested capital. Based upon its earnings for 1919, the amount which would have been available for the employees if the plan had been in force at that time, would have been $4,675,000.

Increases Stock $90,000,000

Stock reserve for the purpose consists of $20,000,000 common and $40,000,000 preferred. In order to provide for the compensation plan and for other purposes the stockholders increased the authorized preferred stock from $60,000,000, to $100,000,000 and the common from $80,000,000 to $130,000,000, a total increase of $90,000,000.

According to the plan the employees will be divided into two groups, those who are in executive and managerial positions and those who are not. The former will receive one-third of the extra compensation fund and the latter will receive two-thirds part in the company's 7 per cent preferred stock and part in cash. The funds will be distributed in proportion to the actual earnings of each employee for the year and the relation it bears to the aggregate earnings of other employees in each group. Common stock will be distributed instead of preferred to the employees in the first group.

Public to Judge Value of Trucks

Advertising Managers to Combat Unfair Attitude of Banks in Big Campaign

CHICAGO, July 29 — Continuing the effort to keep truck sales up to normal, the National Association of Motor Truck Sales Managers, at a meeting of committees and directors at the Union League Club yesterday, planned an advertising campaign to run in 30 big city newspapers.

This copy will tell the story of the truck and the truck industry, will endeavor to remove any unfavorable impressions held by the public and is intended to have influence on those bankers who are not yet sold on the necessity of keeping automotive transportation going, as regards manufacture, sale and use.

Five advertisements will be run, every other day or every third day. The expense, estimated at $89,000, will be borne by makers of trucks and parts.

Conditions in the truck field are becoming more acute daily and it is recognized that some important action, directed at the local banking interests, is needed at once. Truck makers feel that the present condition will improve materially by October and that the industry can be preserved in its present condition if methods can be devised for keeping a certain volume of output moving during the interim.

Some truck factory men have secured a lifting of credit restrictions by their individual efforts, and this work will be expanded, but it is considered inefficient for each individual banker to have to be sold on the idea by individuals from the industry, for only a limited number can be talked with in the time existing for work.

Engineers to Study Rural Highway Grades

NEW YORK, July 28—Investigations designed to determine economical grades on rural highways, will be undertaken by a special committee of the Engineering Division of the National Research Council headed by Prof. T. R. Agg of Iowa State College, a highway engineer. The tests will be conducted on the old national highway near Columbus, Ohio, and will begin Sept. 1. The program for the tests follows:

Three-quarter ton trucks with pneumatic tires, Sept. 1.

One ton trucks one with pneumatic and one with solid tires, Sept. 5.

Two ton trucks, one with solid and one with pneumatic tires, Sept. 8.

Three and one-half ton trucks, equipped with both kinds of tires, Sept. 12.

Five ton trucks with solid tires, Sept. 15.

Highway engineers long have felt the need of more adequate information concerning grades, especially as they relate to the operation of motor trucks and the experiments which will be carried on at Columbus will be more thorough than any hitherto attempted.

The first problem to be undertaken is that of determining the effect of grades on motor trucks. The trucks to be used will be supplied by the motor truck committee of the National Automobile Chamber of Commerce. In the cases where trucks of the same size equipped with both kinds of tires are to be used, the vehicles will be identical in all other respects.

Limited Receivership Proposed for Allen

COLUMBUS, Aug. 2—A creditors' committee of the Allen Motor Co., which is now in receivership, has addressed an appeal to the creditors, urging them to act promptly in executing powers of attorney for the committee to act in their behalf. Under the plan proposed by the committee the receivership would be limited, and the stockholders would advance $500,000 to the company to be used in future operations.

The cash advanced would have preference over any present claims, but in view of the fact that the stockholders would trustee their stock and absolute control of the situation would pass to the creditors' committee, it is asserted assurance would be given that every creditors' interest would be safeguarded and that advantage would be given to none. The committee says that this plan contemplates placing the company on a proper manufacturing and merchandising basis as well as making possible refinancing, which might eventually mean payment of one hundred cents on the dollar to present creditors.

Warning is given that the court will not regard favorably the indefinite continuation of the receivership and that a forced sale of the assets would mean heavy loss to the creditors. The committee announces that the plan cannot be successful unless it is given control of at least 90 per cent of the claims.

FIRST LAFAYETTE TO NEW YORK

INDIANAPOLIS, Aug. 2—The first LaFayette car has left the factory here for delivery to H. T. Porter, president of the Porter-LaFayette Co. of New York. Within a month every LaFayette agency in the country will have a car and production at the factory will increase from day to day.

BODY COMPANY RECEIVER ASKED

INDIANAPOLIS, July 31—A receiver for the Indianapolis Body Corp., builders of automobile bodies, was asked in a suit filed in the Circuit Court July 30, by the People's Coal and Cement Co. It is charged in the complaint that the corporation has many debts which are overdue. George F. Cottrill, president, and F. H. Vogel, assistant treasurer, both of St. Louis, Mo., are named as defendants in the suit.

Biddle Creditors Declare Insolvency

Involuntary Bankruptcy Filed Against Motor Company—Failed to Get Cash

NEW YORK, July 31—An involuntary petition in bankruptcy was filed in United States District Court to-day against the Biddle Motor Car Co., a Delaware corporation, engaged in the manufacture of automobiles in West 142d Street. The petitioning creditors, all of whom have been heavily interested in the company, were: Walter H. Lippincott, with a claim of $42,000; N. Myers Fitler, $42,000, and Van Horn Ely, $12,500. All the claims were for money loaned. The liabilities are estimated at $375,000 and the nominal assets at $50,000.

The Biddle company was purchased early in May by a syndicate ostensibly headed by Stephen N. Bourne, formerly secretary of the United States Shipping Board, Emergency Fleet Corp., but it was generally understood that the moving figure in the syndicate was H. C. Maibohm, president of the Maibohm Motors Co. Others in the syndicate besides Lippincott, Fitler and Ely were G. H. Stetson, the hat manufacturer, and Wilson Potter.

When the syndicate took over the Biddle company, Maibohm took upon himself the task of providing it with $189,000 in cash and 3000 shares of the stock of the Maibohm company. It was not the understanding that the cash was to be his own. The failure of the company is attributed by Bourne to the inability of Maibohm to bring in the expected cash as working capital.

The Biddle company was in production and had an excellent inventory except that it lacked two essential parts for its car. Forty cars were ready to be assembled except for these parts when the petition was filed. It is understood that if $20,000 more had been provided these cars could have been finished and sold, as orders were on hand for practically all of them.

RESTRAINS PARTS MAKERS

CHICAGO, Aug. 3—Perpetual injunctions have been entered by Judge Landis in the United States District Court, enjoining Joseph Weidenhoff and Paul G. Neihoff & Co., both of this city, from making, or selling parts which had been made previously, as replacements on Connecticut Ignition systems.

MOTORCYCLES EXPORTS GROW

WASHINGTON, July 30—Motorcycle exports for the year ended Dec. 31, 1919, totalled 24,481, valued at $6,687,436. Exports for the first six months of the year were 10,514 machines, with a value of $2,838,333, and for the last six months, 13,967, with a valuation of $3,849,103.

Car Outlook Poor in France-England

Prohibitive Costs of Operation Hamper Trade Development Finds M. A. M. A. Manager

NEW YORK, Aug. 4—Neither in France nor England is the outlook bright for the automotive industry, according to the impressions gained in those countries by M. L. Heminway, general manager of the Motor and Accessory Manufacturers Association, who returned to this city last week with C. E. Thompson, president of the same organization. They went abroad to attend the organization meeting of the International Chamber of Commerce. Discussing to-day his trip abroad, which consumed about two months, Heminway said:

"In view of the short time which I had to spend in investigating foreign conditions I hesitate to make an expression of my opinion. I was very much impressed with the extent to which Belgium, France and England have been able to recover their industrial losses.

"Belgium impressed me as being far from a destroyed nation. Here industries are reported as approximating 80 per cent of normal production; here devastated areas have been largely restored; here people and children in the poor sections seemed well fed, hearty and happy.

"I think no one can go to France without experiencing two strongly distinct feelings: First, one of overwhelming depression at the awfulness of the destruction, and then a feeling of deep admiration for the wonderful spirit as well as the physical recovery which has been made there. I fail to see how any one who visits the devastated industrial section in northern France can come away with anything less than a firmly established confidence in the ability of France to fulfill any and all of its obligations.

England Heavily Taxed

"In England the people have been very heavily taxed, and the taxes are increasing, with the result that the labor situation in England at the present time is in a critical condition. The well informed Englishman, of course, recognizes this condition, and while here and there you will find some pessimism, the general feeling is one of optimistic confidence that matters will be adjusted satisfactorily and that the workmen will settle down to their tasks in a normal way.

"The outlook in the automobile industry, as I view it, is not at present a bright one. In France I was informed that the productive capacity of the automobile plants is sufficient to take care of the estimated demand for five or six years. While they have not made very much progress in the way of mass production, some of the manufacturers have a tendency toward it, as in the case of Citreon. The cost of operation is a deterring factor, as in France to-day gasoline costs about $1.30 a gallon. There is apparently very little interest taken in standardization, and while some of our manufacturers are doing business there, I feel that France does not offer very attractive opportunities.

"The same opinion obtains with regard to England. There, more than in France, is opposition to American aggressiveness. Some of our manufacturers of smaller cars, as well as tires, and a few other accessories, constitute to the British mind a real menace to their home industries, and various methods of meeting American competition are being actively discussed.

Commercial League of Nations

"The primary object of my going abroad was, of course, to attend the organization meeting of the International Chamber of Commerce. This is a project in which I am very much interested, and I am extremely hopeful that this organization will be succesful in carrying out its plans. I am happy to say that the Motor and Accessory Manufacturers Association is a charter member, as I believe the International Chamber of Commerce has the possibility of becoming the most important association of men that has ever existed.

"I realize that this is a very broad statement, but I feel that men of vision, who will study the constitution on which the Chamber is planned, will agree with me. Most of our wars have been based upon selfish commercial purposes, and I am hopeful that the International Chamber of Commerce may become the commercial League of Nations which will result in such a broad international understanding and confidence that future wars may be prevented. This work, of course, cannot succeed without the moral and financial support of the leading men in all our industries, but I am quite confident that this support will be given when these men realize the plans of the organization and the seriousness of those able men who are back of it."

FREIGHT RATES AFFECT CARS

DETROIT, Aug. 5—Freight rates under the proposed new schedules probably will result in an increase in the number of driveaways from factories. It is also expected that with the increase in rates more of the leading manufacturers will establish branch assembly stations through the country and save rates by shipping cars in knocked down condition or semi-finished state.

RECEIVERS TO SELL LITTLE

DALLAS, July 31—All the material properties of the Little Motor Kar Co. will be sold to the highest bidder on Aug. 5 by the receiver. Former officers of the company have been in trouble with the Federal authorities because of alleged violations of the postal laws in the sale of stock. The company was capitalized at $3,000,000.

Seek Final Action on Maxwell-Chalmers

Financial Backing Waits Selection of Satisfactory Executive —Propose Control Board

NEW YORK, Aug. 4—Another meeting which it is hoped will iron out the tangle in Maxwell-Chalmers affairs will be held at the Chase National Bank in this city to-morrow. Interests connected with the two companies have been in almost continuous session for the past fortnight, either in this city or Detroit.

Bankers interested in the two companies assert there is no logical reason why a satisfactory arrangement cannot be reached which will result in the merger of the two companies being declared effective. The consolidation agreement expired July 31 and it was extended for another thirty days, although it was understood there would be no further extension. Bankers are awaiting a settlement of differences.

The banks are standing pat on their determination to advance no more working capital until some new plan of factory management satisfactory to them is worked out. There have been many reports in this connection in the past week, but no definite agreement has been reached. The presidency of the merged company was offered to C. Harold Wills and Barney Everitt, but it is understood both declined. The Wills-Lee Co., headed by Wills, expects to have its own car in production by fall.

The next proposal, and one which still is hanging fire, was that the affairs of the merged company be placed under the direction of a board of control composed of Wills, C. W. Nash of the Nash Motors Co. and Walter P. Chrysler, who is now general manager for John N. Willys. It is understood these men might be willing to serve if the work would require only a small part of their time, but the bankers may not be satisfied with a part time arrangement.

The chief concern of the Maxwell company, which is operating the Chalmers plant under lease, is to convert a part of its unbalanced inventory into cash.

The plants of both companies reopened last week after being closed for inventory.

NO AUGUST PRICE CHANGE

DETROIT, Aug. 4—No price changes are announced in the Detroit zone as of Aug. 1. Rumors had spread that car prices were going to increase on that date but it is general opinion that no changes will be made for some time to come and hardly in a downward direction then.

New prices on Dodge cars have gone into effect as follows: Touring, $1,285; roadster, $1,235; sedan, $2,150; coupé, $1,900; panel business car, $1,330; screen business car, $1,270. All are f.o.b. Detroit.

Sinclair Creditors to Decide Action

Truck Contract with Government Awaits Decision—Were Developing New Car

NEW YORK, Aug. 4—New York creditors of the Sinclair Motors Corp. met here yesterday to discuss the affairs of the company and adjourned to attend a general meeting of creditors which will be held at Springfield, Mass., Aug. 6. The company has a contract from the Government to build 75 Militor trucks and it is understood an effort will be made to provide funds for the completion of this work. It also manufactures Militor motorcycles and was preparing to bring out a passenger car. Its financial difficulties are understood to be due in part to the fact that large sums have been spent in experimental and development work. Early in the year it was announced the company's program contemplated the manufacture of 20,000 motorcycles this year.

The Sinclair Motors Corp. is a re-organization of the Militor Motors Co., which was a merger of the Knox Motors Co. and the Militor Corp. Knox Motors took over the property of the Knox Automobile Co., which was sold in bankruptcy in 1914. The original Militor Corp. was organized for the production of war vehicles for the Government. In its extensive laboratories at Jersey City were developed the Militor motorcycle and the Militor standardized four-wheel drive truck. The present plant is located at Springfield.

An attachment was filed last week by the Knox Motors Co. against Neil R. Sinclair, the Sinclair Motors, and Edward McMills of Buffalo, for $75,000. The action was brought to recover on $62,000 of notes indorsed by Sinclair and McMills.

Moore Stockholders Ask for Receivership

DANVILLE, ILL., Aug. 3—Upon petition of five Indiana stockholders, Judge English of Federal court has granted a temporary restraining order against officers of the Moore Motor Vehicle Co. of Danville and the Moore Motor Vehicle Co. of South Dakota. James H. Elliott of this city has been appointed temporary receiver and has taken charge of the plant at Tilton. Arguments for the appointment of a receiver and a permanent injunction will come up later.

Officers of the Moore company contend the corporation is solvent, that it has property worth $475,000 and that its liabilities do not exceed $175,000. A proposition made by the Marwin Truck Co. of Kenosha, Wis., to purchase the plant for $225,000 was submitted to the stockholders last month. A committee was appointed to investigate the offer and file a report.

In the bill asking for the appointment of a receiver the officers are charged with conspiracy. It is alleged they sought to defraud the stockholders by manipulating stock of the Moore Motor Co. of Minneapolis, which they are asserted to have sold to themselves. It is further charged that while the assets of the Illinois and South Dakota corporations do not exceed $450,000, stock to the amount of $2,000,000 has been sold throughout the United States and Canada and in other countries.

The petitioners assert that as far back as June 20 a meeting of stockholders was called in an effort to raise $25,000 to pay for materials and claims past due, but that the attempt was not successful. George L. Moore, J. F. Bichle, Edward V. Gallagher, James H. Vickers and Alfred C. Leonard, owners of 50,000 shares of special voting stock, are said to exercise complete control over the company and it is alleged they are not working in the interests of the stockholders.

Moore and his associates assert that the charges will be proven groundless and that the solvency of the company will be established. They seem to agree that acceptance of the offer of the Marwin company offers the best solution of the problem. It is their contention that court action will dissipate the assets so that the stockholders will receive little or nothing.

Ford Passes Million in Year's Production

DETROIT, Aug. 5—Ford Motor Co. ended its fiscal year July 31, having made 988,871 cars and trucks and 78,006 tractors. When final returns come in from all branches 300 to 500 cars will be added. The total of trucks made was 129,188.

At present production in the Ford factory is running over 3500 cars and trucks a day. It is intended to build 1,250,000 cars and trucks in the fiscal year just started and 200,000 tractors. The Ford company is now 200,000 cars behind orders. Production for July was 92,513, as compared with 84,003 for June. It is estimated that production at the Ford factory will be over 4000 a day in two weeks.

No slackening in demand is reported and production is being pushed ahead as rapidly as possible.

Louisiana Boys Leave to Study Tractors

BATON ROUGE, Aug. 5—The special train which is to carry 225 Louisiana high school and Agricultural College boys on a tour of the agricultural colleges and model farms of the Middle West, with a special view to the study of the use of tractors and trucks and other automotive implements in farming, left Baton Rouge August 3, to return about August 19. Expenses of the trip are being borne by the parishes of the state, virtually every parish having at least one boy in the party, and by various civic and agricultural organizations throughout Louisiana.

Philippines Offer Market for Cars

Demand Only Partly Filled by Exports—Finances Easier Than Here

NEW YORK, Aug. 2—Distributers and dealers in the Philippine Islands have been securing approximately 50 per cent of the cars they could dispose of, and approximately 75 per cent of the trucks they had orders for, according to Mark Scott of the Bachrach Motor Co., Inc., Manila, who has been in this country for some weeks and sailed recently.

Scott estimates that there are approximately 8000 cars and trucks in the Philippine Islands and that an extensive market will exist there for many years. Roads are being much improved by the government which is accelerating the sale of cars and trucks. Truck sales are being made more in plantations than for city use. Finances are much easier in the Philippines, so far as car sales are concerned, than in America, which is largely due to the staple crops of the Islands, sugar, tobacco, and hemp, having been in strong demand since the war.

At present it takes approximately 100 days from the time a shipment of motor apparatus leaves the factory until it is unloaded at Manila. There is no shortage of shipping space owing to many of the shipping boats having been put in the Philippine service.

The used car business in the Philippines is about on a par with its condition in this country. A trade enters into approximately 25 per cent of all new car sales. The problem of time payment is also a recognized factor in the Philippines as approximately 50 per cent of the cars are sold on this basis. The terms are generally one-half cash and the remainder on time. Most of the large distributers handle their own time financing. With trucks approximately 25 per cent of the sales is for cash and the remainder on time extending over a period of about one year.

Scott looks upon Manila as the great international distributing center of the Orient and within 3500 miles of that city lives 800,000,000 of the world's population. Up to the present time no European cars have made their appearance in the Philippines.

OLNEY MOSLER RECEIVER

NEW YORK, Aug. 5—Federal Judge Hand has appointed Percy B. Olney, Jr., receiver for A. R. Mosler & Co., manufacturers of spark plugs at Mount Vernon. Bond was fixed at $25,000. The action was taken in an equity instituted by the Frenchtown Porcelain Co., a creditor for $29,000 and the National Folding Box Co., which has a claim of $5,753. The liabilities aggregate about $437,000 and the assets, including notes, trade acceptances, accounts receivable, merchandise and materials, are estimated at $610,000. Mosler is one of the oldest spark plug makers in the business.

SPECIAL CABLES

No Limitation on Bennett Race Planes

Important Developments Expected in Engines — Captain Schroeder to Fly Army Plane

(*By Cable to Automotive Industries*)

PARIS, Aug. 2—The James Gordon Bennett airplane race which will be held at Etampes, near Paris, Sept. 28, will admit machines without limitation as to the size of the engines and without restrictions covering the surface of the planes. The only technical restriction is that the plane must be designed with a factor of safety of six for a monoplane and of four for a multiplane. The planes entered must carry sufficient fuel for a flight of 186 miles, which is the distance to be covered in the race. The planes must be received on the ground not later than 7 a. m. Sept. 27. Competitors will be permitted to use their own fuel, as surcharging is not forbidden in rules and the assumption is that it can be employed.

Unusual interest is being displayed in France in the race this year, as it is believed important developments may be disclosed in airplane engines. The announcement that Capt. R. W. Schroeder, holder of the world's altitude record, will pilot an American Army plane in the race, has been received with interest. The race authorities have been informed that Captain Schroeder will use a Verville plane of the pursuit type built at McCook Field, Ohio. Capt. Corliss S. Moseley will substitute for Captain Schroeder if he is unable to fly.

French Exports Increase

French automotive exports for the first six months of 1920 show a large increase over the same period for last year. The total value reached $89,427,000. In this amount is included $33,148,400 for passenger cars; $26,760,200 for trucks; $25,560,000 for automobile tires. During the same period French automotive imports decreased from $41,357,400 to $30,700,600. The falling off in imports may be attributed largely to the fact that for a considerable part of the second quarter the Government ban on foreign cars was in force.

To Lay Oil Pipe Line

The Government has given its approval to the project for laying the pipe line to carry gasoline and heavy oil from Havre to Paris. A company has been formed and it is expected the work of laying the line will be started at an early date so that construction can be completed within a year.

The British Dunlop Tire Co. has laid off 1700 hands during the past two months. Curtailment of production is attributed partly to an unavoidable slowing up occasioned by a moulders' strike and partly to American competition.

France will send only one boat to the Harmsworth Trials at Southampton. Three American boats already have arrived there and a team of three English boats is being selected from six competitors. Spain will send one contestant. All boats entered are equipped with airplane engines.

Tractor Trials Oct. 1-6

The French tractor trials will be held Oct. 1-6. They will be open to all nations and are expected to be the most important ever held. The tests will be conducted in the wheat-growing country around Chartres. The land on which the tests will be carried out covers 2500 acres.

The Automobile Club of France announces that it will hold a competition next winter for tractors capable of operating over snow and made roads.

BRADLEY.

NEW PLANE SPEED RANGE SET

PARIS, July 15 (*Special Correspondence*)—The preliminary trials for the "Prix du Grand Ecart," offered by *L'Auto* to the French aviator in a French airplane who flies twice over a three kilometer course with the greatest difference between the two speeds, were held the beginning of July. There were three machines entered. M. Bossoutrot, on a Sport-Farman, was classed first.

The mean time, out and back trips, for the slow speed was 7 min. 41.3 sec.; giving a speed of 14.6 m.p.h. The time for high speed was 1 min 17.2 sec., giving a speed of 87.1 m.p.h. These figures show a speed range of 1:5.98. When the Wrights first flew their speed range was about 1:1.2. It may easily be seen that tremendous advances have actually been made. Even during the war a speed range of 1:3 was considered very good.

ALGIERS SERVICE TO START

PARIS, July 10 (*Special Correspondence*)—Before the end of the present year the Breguet Airplane Co. intends to run a regular air service between Marseilles and Algiers, Northern Africa, with the new four-engine Type 20 plane. This machine is an entirely new construction, with all metal fuselage and wings, carrying four Bugatti motors connected up to a single tractor screw. The design allows one or more engines to be disconnected in case repairs or adjustments have to be carried out in the air. As the distance over the open sea is 700 miles, the plane will be fitted with floats, and will also have a marine screw by means of which a speed of about 10 knots can be maintained on the water.

British Business Slumps Seriously

Heavy Taxation Causes Economy Wave — Cancellations Fill Showrooms with Cars

LONDON, July 24—(*Special Correspondence*)—The automotive trade in England has slumped almost to the vanishing point. Experienced dealers declare they never found general conditions so bad. The heavy taxation in May caused a wave of economy which quickly made itself felt in the motor car field and orders for many high priced cars have been cancelled.

Dealers now are suffering from the optimism they felt at the time of the last Olympia Show when they placed unusually heavy orders in the hope of getting a 50 per cent allotment. They are now having the cars thrown at them by the manufacturers and will get from 75 per cent to 100 per cent of their contracts. With this outlook the trade prospects do not exceed 40 per cent.

Showrooms everywhere are crammed full of cars. Works are full of war worn trucks and cars which traders bought in the spring in the expectation that they could make a profit. They now are glad to get rid of them at a loss.

The same is true of American cars. Almost every make has been brought over here and all too often by financial houses or general importers who were anxious to make quick profits on large shipments. To-day there are many hundreds of cars at the docks which cannot be cleared because of lack of funds and there is the fear they may be thrown on the market for what they will fetch.

English banks will not grant a cent of credit for American automobiles. They are too heavily interested in the British motor companies, most of which are in more or less unhappy position. Stocks of some of those which are heavily capitalized have slumped 75 per cent within six months of their issue. The newer companies which planned to do a big business are the hardest hit.

Spoiled by Prosperity

The motor trade has been spoiled by the abnormal prosperity of the past eighteen months. All the dealers have been accustomed to sell their contracts wthout any salesmen and with very little staff. Usually it was a case of distributing cars as a personal favor to intimate friends. Now the whole situation is reversed and the spoiled dealers are not going after the job as energetically as they should.

One factor which may change the situation is the possibility that the Government may realize suddenly that the present policy of excessive taxation, particularly the 60 per cent excess profits tax, is stopping all new business and preventing all expansion. If the excess profits tax were abandoned business would take a new interest in life.

S. A. E. Gets Bulletin on Fuel Situation

Government Co-operation, Fuel Economy and Refining Efficiency Means to End Shortage

NEW YORK, Aug. 2—Means by which the present shortage of fuel for internal combustion engines can be remedied are outlined in a memorandum addressed to 5000 members of the Society of Automotive Engineers by R. L. Welch, general secretary of the American Petroleum Institute. They are:

"First, the Government of the United States must co-operate with the oil business and with the automotive industry at home and abroad if the gasoline problem is to be solved.

"Second, the greatest possible efficiency must be gotten by the automotive industry and by the consumer from motor fuel or the problem will not be solved.

"Third, the oil industry must be more efficient and must get more gasoline from each barrel of crude."

With reference to the second remedy, Welch says:

"There is need to curb the present demand of the American public to have motor cars with motors developing 70 to 80 hp. which are operated generally at 20 miles an hour.

"The recent change in gasoline prices occurred by reason of the change in the relationship of production to consumption. There never was a time in the history of the oil business when there was so much competition as there is to-day, and there is no more competition in the oil business, I believe, than there is in the automotive business.

Vast Imports Probable

"No one person and no single group of persons settles the price of gasoline. Nobody settles the price except the producer, the consumer and the law of supply and demand. The export of gasoline has very little effect upon the situation, for up to the last two or three years our exports and imports, broadly speaking, were practically balancing. At the present time, however, it looks as though we shall have to import vast quantities of oil."

As a preface to his memorandum Welch says:

"The time has arrived when it is possible to say, as far as ordinary human foresight can go, that the motor fuel of the future probably will be substantially the same product known as motor gasoline to-day." He adds, however, that "it seems equally clear that there will not be enough to go around unless the automotive industries co-operate to conserve gasoline. There is no doubt," he says, "but that such conservation can be accomplished by proper design."

"The time has now come," he adds, "when it would seem as though the problem of the automotive industry is to build engines that instead of making from 7 to 12 miles on a gallon of gasoline will make 20 or 30 on the same amount. The problem is not to build engines to burn refined oil, or some product of petroleum other than the present motor fuels. At the present time there is not enough petroleum to meet all requirements.

"Should not the horsepower of the heavy cars be cut down, and could not the cheaper and lighter cars be so equipped so as to get all the speed desirable from a very much smaller amount of gasoline than is now used?

Co-operation Most Essential

"It will be possible to furnish fuel provided we have the co-operation of everybody who has a proper relationship to the problem. It is doubtful whether it will be solved unless we have that co-operation. If the Government of the United States will co-operate with the oil industry, the same courage and the same business ability which have characterized the automotive industry and the oil business will get the oil."

Welch points out that the production of crude oil in 1911 was 314 bbl. per automotive vehicle but that it had fallen to 50 bbl. per vehicle in 1919. This production of crude oil will be cut down this year to 40 bbl. per car, and if 12,000,000 automotive vehicles are registered in 1922, he predicts that there will be produced in this country only 35 bbl. of crude oil per car.

Kentucky Wagon Drops 150 From Working Force

LOUISVILLE, July 31—Between 100 and 150 men have been laid off at the plant of the Kentucky Wagon Mfg. Co. during the last two weeks, it was said this morning by R. V. Board, president, in explanation of a report that all work had been shut down.

"Most of these men we took on during the six months' rush that always comes in the automobile business from January to June," said Board. "When the letdown came naturally we had to lay these men off to keep our old employees.

"At this particular time there are two other reasons which made it necessary to cut down the force. Congestion in railroad transportation made delivery of material to us late and hindered delivery of our manufactured product. At the present time we have a vast quantity of goods in the hands of railroads ready for delivery to dealers.

"The money situation is another thing, preventing many dealers from making payments, and forestalling many orders. However, we all hope the situation will improve right along."

RUGGLES SITE INDEFINITE

ALMA, MICH., July 31—F. W. Ruggles, formerly of the Republic Motor Truck Co., who is gathering an organization together to manufacture commercial vehicles, may not locate in Saginaw, in spite of former reports to this effect. At Ruggles' office it was stated to-day that he may remain in Alma.

Kansas City Banks Express Optimism

Early Lifting of Credit Strain Now Expected—Transportation Only Problem

KANSAS CITY, Aug. 2—Dealers and bankers here are more optimistic concerning credit and financial conditions as reports of record breaking crops in Kansas City's trade territory continue to come in. The present wheat harvest has been estimated to exceed all previous yields and with ample money to care for the crop Kansas City leading bankers are optimistic regarding future business prospects.

Automobile dealers who have been laboring under extraordinary credit conditions in this district see prospects of relief and good business after the harvest is moved. The freight car shortage is the disturbing factor here both from the angle of car shipments and the tight credit conditions due to the inability to move commodities.

Dealers are receiving approximately eighty cents on the dollar from their bankers where many formerly received 100 cents credit. The strongest dealers are not discounting their time paper but are holding it until maturity and are financing their time sales through their own resources. Bankers here say that all dealers will be out of debt by October, though some dealers are inclined to doubt this statement. The agricultural loans of this district will be liquidated as the country demands the agricultural products congested here and thus free a large volume of credit for commercial needs.

"From all sections of our territory come reports of record crops and, though we have been through trying conditions, we will not, with the wealth of agriculture and live stock in sight, come to adverse conditions," said J. W. Perry, president of the National Bank of Commerce, recently. "Our need is the movement of these commodities," continued Mr. Perry.

SHALER VULCANIZER UPHELD

WAUPON, WIS., July 30—The C. A. Shaler Co. has secured a decision in the United States Circuit Court of Appeals upholding its basic rights to patents on solid fuel vulcanizers which it has been manufacturing for five years. The decision was rendered in a suit against the Presto Patch Co. of Philadelphia, which was alleged to be infringing the Shaler rights. Marvel Accessories Co., Cleveland, and the Safety Vulcanizer Mfg. Co. of this city are operating under licenses granted by the Shaler Co.

FORD MILWAUKEE BUILDS

MILWAUKEE, Aug 2—A two-story factory addition, 200 x 350 ft., will be erected by the Ford Motor Co. at its assembling plant in Milwaukee. The present building is 120 x 300 ft., six stories high. A 50 per cent increase in space and capacity will be provided.

INDUSTRIAL NOTES

The Lavine Gear Co., Milwaukee, expects to begin work by Oct. 1 in the third large addition to its original factory which is now nearing completion. The steel work is going up and it is hoped the equipment will be installed within sixty days. The new building will contain the tool room, automatic machine, inspection and testing departments as well as a fully equipped chemical laboratory and a specially designed heat-treating department. It will enable the company to keep abreast of its expanding business.

Sewell Cushion Wheel Co., Detroit, reports an increase of 136 per cent in sales for the first six months of 1920. To meet the demand for its products the company has added 20,000 feet of floor space to its plant here and has bought adjoining land for further development.

Davis Motor Car Co., Richmond, Ind., has acquired part of the property formerly occupied by the Westcott Motor Car Co. in that city. The additional space will enable the Davis company to double its output.

N. A. Petry Co., Inc., Philadelphia, has purchased a new plant which will permit of greatly enlarged production of the company's line of automobile accessories.

Pollak Steel Co. is making extensive improvements in the rolling mill at Marion, Ohio. Several additions are being made which will enlarge the plant output.

Heil Co., Milwaukee, is adding to its plant and when building operations are completed will have 150,000 feet of manufacturing space.

Flexible Steel Lacing Co., Chicago, will occupy its new factory at 4607-31 Lexington Street Sept. 1.

Dole Valve Co., Chicago, has moved into its new plant at 1923-33 Carroll Avenue.

YOUNG TO BUILD TRUCKS

CLEVELAND, Aug 2—Production of Young motor trucks will start in this city within sixty days, according to H. B. Young, president. In addition to Young, who for the past ten years has been truck division manager of the Chicago Pneumatic Tool Co., manufacturers of Little Giant and Giant motor trucks, the officers are B. L. Van Woert, former assistant manager of the Chicago Pneumatic Tool Co., vice-president; O. L. Travis, former sales manager for Swinehart tires, secretary; H. W. Graham, bookkeeper and teller of the Garfield Bank, treasurer. Directors are W. C. Duntley, A. C. Thomas and R. J. Burns. Duntley is president of the Duntley Pneumatic Tool Co. and former president of the Chicago Pneumatic Tool Co.

RANGER FOUR NEARS MARKET

HOUSTON, TEX., July 30—The Ranger Four passenger car will be put on the market the latter part of September by the Southern Motor Mfg. Assn., Ltd., which already is marketing Ranger trucks, tractors, trailers and commercial bodies.

In connection with the appearance of the new model, the Ranger road race will be held with a big purse as the prize. This will be a 3500-mile endurance test in the form of a tour of the Southern States, starting and ending at Houston.

Two Ranger cars will make the run, one going from Houston to San Antonio, Austin, Dallas, Oklahoma City, Little Rock, Memphis, Nashville, Chattanooga, Atlanta, Montgomery, Jackson, Baton Rouge and New Orleans, back to Houston. The other car will cover the same route in the reverse direction.

Gray & Davis Passes Into Bosch Control

BOSTON, Aug. 3—Stockholders of Gray & Davis, Inc., at a special meeting here yesterday, authorized an agreement whereby the American Bosch Magneto Corp. of Springfield becomes the exclusive selling agent for the starting, lighting, battery ignition systems and other accessories made by the Boston company. The agreement provides for immediate executive control by the Bosch company and the new officers of Gray & Davis are:

President, Arthur T. Murray, president of the Bosch Magneto; vice-president, George A. MacDonald, treasurer of Bosch Magneto; vice-president and general manager, G. J. Lang, vice-president of Bosch Magneto; treasurer, B. J. Moses, treasurer of Gray & Davis.

Proposed selling agency contract will run until Jan. 1, 1936, subject to prior termination at the option of Gray & Davis on the first day of January or July of any year on one year's notice and subject to termination by American Bosch Magneto Corp. if at any time its officers are not left in control of the management of Gray & Davis. The contract will not cover products not related to motor vehicles, such as the unit car, house-lighting system, and induction motor. The commission payable to the American Bosch Magneto Corp. will be 10 per cent of the net prices except as to articles sold at retail through service stations which will be sold to American Bosch Magneto Corp. at a fixed discount from list prices.

As a condition of entering into the selling agreement American Bosch Magneto Corp. will require that its officers be given control of the operation of this company, and in order to secure their interest in the management an option running until Jan. 1, 1924, will be given by Gray & Davis, to the new managing interests on any part or all of 30,000 shares of its common stock at par in cash, $25 per share.

RAUCH & LANG PLANT STARTS

SPRINGFIELD, MASS., July 31—Operation of its new plant at Willimansett has been started by the Rauch & Lang Co., manufacturers of the Rauch & Lang electric passenger automobile. The company has been housed in one part of the Stevens-Duryea factory at Chicopee Falls since last February. The transfer of plant location has just been completed and the turning out of electric automobiles is progressing rapidly. It is reported that despite the freight situation there has been little delay.

METAL MARKETS

FOR the time being there is a lull in buying by automotive interests. A Cleveland correspondent stresses the fact that out of sales of 4,000 tons of pig iron reported by a selling agent, not a single ton was for automotive purposes, all of this tonnage going to agricultural implement and stove manufacturers. Tractor manufacturers are, however, prudently active buyers. Speaking of the bar iron market, a Pittsburgh correspondent of one of the metal dailies says: "While specifications against contracts from most of the manufacturers of high-priced automobiles have fallen off very substantially, and little new business is coming from such sources, steel makers report that such interests as the Ford, Dodge and Buick companies, whose consumption of steel is very much greater than that of the makers of higher-priced cars, are pressing as hard as ever for deliveries and are preparing for another big season next year."

Steel consumers, in general, welcome the advances granted to the railroads which should make possible the early addition of much needed rolling stock and the furnishing of steel for this will, in all probability, play the most important rôle in the markets in the next six months. It is recognized that steel production has grown far beyond the carrying capacity of the railroads, and it will be up to the steel industry to remedy this defect as speedily as possible as an act of self-preservation. In spite of all attempts to befuddle the situation, the markets for finished steel are receding, automobile sheets for immediate delivery being about the only exception. Foundry iron, on the other hand, still displays a rising tendency.

Steel—Sheet bars, heretofore strong at $75, were purchasable in the last few days on firm bids of $70. Full finished sheets for third and fourth quarter shipments are quoted at around 8½c., Pittsburgh base, but brokers, taking advantage of those famished for a few tons, ask 13c. Some automotive purchasing agents asked Ohio valley mills to hold up shipments of heavy blue annealed sheets for truck frames and bodies for 60 days and others want deliveries extended from third to fourth quarter. Cold rolled strips are in less demand in Pittsburgh, 10c., base, being quoted. Automotive buying of bolts and nuts has slowed up.

Aluminum—Fresh business in ingots and alloys appears to be largely held in abeyance, but some automotive buyers are sounding the market for sheets, probably because they want to guard against being caught short next winter. Rolling capacity is still inadequate.

Pig Iron—Several Buffalo district furnaces refuse to book further business for 1921 deliveries, claiming that $45 pig at prevailing coke prices is an invitation to the sheriff. At Birmingham sales at $42 for the first half of 1921 are reported.

Brass—Although the Connecticut strike is officially ended, the mills are still suffering from want of efficient labor and far behind in deliveries on orders booked last spring.

Copper—While producers adhere to the 19c. quotation, speculative holders, who are pressed for money, appear to be in a mood to sell at 18½c. for spot cash.

Lead—The supply continues light and values strong, demand for storage batteries being especially active.

Zinc—The market is feeble and consuming buyers apathetic.

Tin—The market is neglected by consumers.

FINANCIAL NOTES

Motor Wheel Corp., Lansing, Mich., has declared a 2 per cent cash dividend on common stock, payable Aug. 20. The semi-annual statement shows orders totaling $12,000,000 and profits before deduction of Federal tax of $300,000 for the three months from March to June. The dividend is moderate in view of the $100,000 profit a month but it is the intention to accumulate a reserve.

Huffman Bros. Motor Co.—Grand Rapids bankers are offering the unsold portion of $900,000 7 per cent participating preferred stock, more than $600,000 of the issue already having been sold at par The company began business in August, 1918, and on May 31, last, had resources of $1,250,584. It has a plant at Elkhart, Ind., and seven distributing stores in the Middle West.

Grant Motor Car Co.—President Shaw announced that the directors deemed it advisable to conserve the present ready cash and had decided to pass the dividend due on the common stock Aug. 1. The preferred dividends will be paid as usual. The company is running at about 40 per cent of normal, but expects to increase production materially in the near future.

B. F. Goodrich Co.—Balance sheet on June 30 showed current assets of $104,470,-421 as compared with $85,874,449 on Dec. 31, last. The current liabilities amounted to $31,902,556 as compared with $31,187,808 on Dec. 31. Regular quarterly dividend of $1.50 a share on preferred stock to be paid Oct. 1.

Nelson Motor Truck Co., Saginaw, Mich.—Capital increased from $500,000 to $1,100,-000 to finance business expansion. The increase is divided equally between common and preferred at $10 par. Permission to market the stock has been given by the Michigan Securities Commission.

Bergougnan Rubber Co.—Declared dividend of 1¾ per cent on preferred stock, payable Aug. 10. Additions to the plant at Trenton which have been under way for several months are nearing completion.

Autocar Co., Ardmore, Pa., will offer 8000 shares of new stock to present holders at par. This additional stock would make the paid in capital $5,000,000.

Fisk Rubber Co.—Sales for the first six months of 1920 were $27,000,000 or 32 per cent in excess of the $20,437,000 for the first half of last year.

Ardrean Auto Supply Co., Painesville, O.—Chartered with capital of $100,000 to manufacture tractors and supplies for motor cars and trucks.

Vaporetor Corp., Milwaukee.—Incorporated at $300,000 to manufacture parts and devices for motor cars, trucks, tractors and gas engines.

L. E. M. Tire & Rubber Co., Racine, Wis.—Incorporated with capital of $200,000 to manufacture tires and mechanical rubber goods.

ASSEMBLE FORDSONS IN WEST

KANSAS CITY, July 31—The Ford Motor Co. will put into operation about the first of the year a new tractor assembling plant here. The plant will have a capacity of assembling about a hundred tractors a day. It will employ six or seven hundred workers. The plant will be erected on a four and three-fourths acre tract adjoining the present Ford motor car assembling plant here. Peter F. Minnock, manager of the assembling plant here will direct both the tractor and motor car plant operations. Minnock, who returned recently from Detroit, estimated that a hundred Fordson tractors would be turned out by the new plant in a day. The Detroit factory had a July record output of 10,400 tractors. The new plant will have 200,000 feet of floor space and it is believed that erection can be completed in four or five months.

Studebaker Earnings Decreased by Conditions

NEW YORK, Aug. 2—Studebaker Corp. and its subsidiaries report net profits, after Federal taxes, of $3,006,-965 for the quarter ended June 30. This is equivalent, after preferred dividends, to $4.71 a share earned on the $60,000,-000 common stock, as compared with net profits of $2,377,772, or $7.32 a share, on the $30,000,000 common stock for the same period in 1919. The company has declared a quarterly dividend of $1.75 on the common and preferred shares.

Net profits for the six months ended June 30 were $7,479,057, or $11.86 a share on the common, as compared with $3,523,481, or $10.21, in the same period last year.

In his report of operations for the second quarter, President A. R. Erskine said:

"The decrease in our sales, as compared with the first quarter, was caused by the switchmen's strike in April, which curtailed our production about 20 per cent, and this fact, plus increased costs of materials and labor, reduced our profits.

"The days of reckless buying of automobiles are over, but there is and always will be a tremendous demand for standard makes of cars, in both domestic and export markets. At the present time we have on hand a large number of unfilled orders, with no finished cars on hand, and the general demand is such that we are compelled to allot production among dealers on a percentage basis. With the marketing of crops and the approach of fall buying we cannot hope to fill the fall demand for Studebaker cars or accumulate a reasonable stock."

TEST NEW PIERCE-ARROW LINE

BUFFALO, July 31—The new Pierce-Arrow truck line of 2, 3½ and 5-ton models, was put through a searching hill climbing test at Colden Hill here to-day under the eyes 500 shop foremen. The tests were supervised by C. L. Sheppy, consulting engineer, and John Talcott, experimental engineer. The new trucks were operated side by side with old line trucks of the same capacities and displayed marked supremacy. All of the trucks carried capacity loads. Following the tests the foremen were told of the reorganization policy of the company by Robert Patton, truck sales manager, and Col. C. M. Tichenor, assistant general superintendent.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, Aug. 5—The ruling rate on the local call money market last week continued at 8 per cent. The range was from 7 per cent to 10 per cent, as compared with 8 per cent to 9 per cent the week previous. The time money market remained dull with rates advancing on Friday from 8½ per cent to 8¾ per cent on mixed collateral and 9 per cent to 9½ per cent bid on all industrials, as against 8 per cent to 8½ per cent and 8½ per cent to 9 per cent, respectively, last week.

The weekly statement of the Clearing House members reflects the heavy drawings being made upon this center by the West and South. The Clearing House Banks reported combined reserves $6,086,520 less than legal requirements, a net decline of $1,810,000, in spite of a decrease in net demand deposits of $33,-593,000.

The marked improvement shown the week before in the technical position of the Federal Reserve Banks as a whole was not maintained the past week. While on the one hand net deposits declined $6,409,000, and bills discounted secured by Government war paper declined $6,354,000; on the other, total bills discounted increased $13,485,000, Federal Reserve notes in circulation $1,933,000, and total earning assets $24,097,000, with a decline in total gold reserve of $5,567,-000. As a result, the ratio of gold reserves to Federal Reserve notes in circulation after setting aside 35 per cent against net deposit liabilities declined from 49.5 per cent to 49.2 per cent.

Governor Harding of the Federal Reserve Board has expressed an optimistic view of the credit situation as regards the ability of the banks to meet the crop-moving requirements. The indicated wheat crop of the Minneapolis and Kansas districts is above the normal, and the general grain situation shows continued improvement. The live stock situation is said to be exceptionally good the country over. There is, however, continued inactivity in certain industrial lines, particularly noticeable in the leather and shoe industries, the textile trades, and the rubber and automobile fields. The rate increase granted the railroads, following the wage award, removes some elements of uncertainty in the general credit situation and should hasten the stabilization of business conditions. The liquidation in industry now under way should in time aid in relieving the credit stringency as it now exists throughout the country.

GOODWILL FORMS NEW COMPANY

LAPEER, MICH., July 30—C. T. Goodwill has organized a company in Lapeer to manufacture wooden steering wheel rims and automobile top bows. The plant is expected to begin operations within a short time.

Men of the Industry

W. C. Morgan has been appointed chief inspector of the Transport Truck Co., Mt. Pleasant, Mich. Morgan was formerly with General Motors, Acme Truck Co. and the Simplex Wheel Co.; Ludwig Arnson, W. A. Neilson and Glenn Rockwell have also been added to the Transport organization, Arnson as special factory representative and the others as members of the sales force.

James E. French has been appointed director of distribution for Dodge Brothers, Detroit. L. M. Kitzmiller is named assistant director of distribution; C. H. Jennings, director of service; D. T. Stanton, assistant director of service; O. E. Mittelstaedt, assistant director of advertising and John J. Palmer, assistant director of foreign sales.

Franklin G. Hill, for several years Eastern manager for Republic Rubber Co., has taken over the Eastern sales management for the G. Kenyon Co., Inc., Brooklyn, makers of Kenyon cord tires and tubes. O. S. Tweedy, formerly with Diamond Rubber Co. and the United States Tire Co., will take over Western sales for the company.

Joe Tallmadge has resigned as assistant sales manager in the east central division of Willys-Overland to become sales manager of the Handley-Knight Co., Kalamazoo. Tallmadge began with the Franklin company in 1909 and later was treasurer of the Atlantic Boat Co. He joined Willys-Overland in 1915.

Joseph L. Hardig has been appointed advertising manager of the motor bearings division of the Hyatt Roller Bearing Co. For the past fifteen months he was assistant advertising manager of the motor equipment division of General Motors, previous to which he was with the Remy Electric Co.

Fred Crebbin, Jr., formerly factory manager of Master Trucks, Inc., has assumed the duties as general manager of the truck division of the Stoughton Wagon Co., Stoughton, Wis. He was formerly with Packard, Thomas, S-G-V and the Hurlburt truck companies.

L. H. Blood, consulting and designing engineer, formerly with Oesterlein Machine Co., Cincinnati, and Brown & Sharpe Mfg. Co., Providence, has opened offices in Cincinnati, where he will specialize in the designing of machine tools.

C. W. Van Beynum has resigned as treasurer and sales manager of the National Underwriter to join the publicity department of the Travelers Insurance Co., Hartford, Conn. He is a specialist on automobile insurance.

W. G. Shultz, sales manager for the Sandow Motor Truck Co., sailed on July 31 on the *Aquitania* on a business trip to England and Continental Europe. He will develop foreign connections for the company.

Roy S. Davey has been appointed general sales manager of Graham Brothers Sales Co., New York. He was formerly general sales manager of the Bethlehem Motors Corp., Allentown.

Chester F. Hockley, formerly vice-president and general manager of the American Hammered Piston Ring Co., has been elected vice-president of the Bartlett-Hayward Co., Baltimore.

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, is spending his annual vacation at Cape May with his family.

Charles I. Ochs has been promoted to general manager of the Eaton Axle Co. He was formerly assistant general manager.

James H. Remington, chief purchasing agent of the Waukesha Motor Co., has resigned, effective Sept. 1.

K. L. Zimmerman has been appointed advertising manager of Henry Disston & Sons, Inc., Philadelphia.

R. T. Hazleton has been appointed works manager of the Cincinnati Shaper Co., Cincinnati.

A. K. Hebner Elected Bearings Service Head

DETROIT, Aug. 5—At a directors meeting of the Bearings Service Co., Ralph S. Lane, Harry J. Porter and Alfred K. Hebner tendered their resignations respectively as president, treasurer and secretary. To fill these vacancies, Hebner was elected president and Dana H. Torrey, secretary and treasurer. Lane and Porter continue as directors.

Both Hebner and Torrey have been connected with the company since its inception. Hebner has acted continuously as general manager and Torrey has been in charge of the sales work from the start. Hebner will retain his title of general manager along with that of president. W. J. St. Onge, formerly with the Wire Wheel Corp., has been appointed to succeed Torrey as sales head.

Ford Seeks Authority to Rebuild Railroad

WASHINGTON, Aug. 2—Attorneys representing Henry Ford to-day filed an application with the Interstate Commerce Commission for authority to issue $1,000,000 in capital stock for the Detroit & Ironton Railway, as lessee for the Detroit, Toledo & Ironton Railway. The application explains in detail the financial standing of the Detroit & Ironton Railway, which was incorporated under the laws of Delaware. It is the intention of the Ford interests to assume the liabilities of the D. T. & I.

The commission has been advised that the Detroit & Ironton Railway Co. will not issue any stock to the public. According to the applicants, the D. T. & I. has been operated unsuccessfully since its incorporation in 1914. The Ford interests propose to rehabilitate the property to provide better service for the shipping and traveling public.

The incorporators of the Detroit & Ironton Co., as given to the commission, are Joseph A. Gordon, president; Fred Osborne, vice-president; E. C. Davis, secretary-treasurer, and Alfred Lucking, attorney.

GREGORY TO BUILD CAR

KANSAS CITY, MO., Aug. 2—Ben F. Gregory, mechanic and inventor, inventor of the Gregory fore wheel drive car, has selected Kansas City as the site for his proposed motor car plant devoted to the manufacture of the Gregory car. The Gregory-Craun Motor Car Co. is incorporated under the laws of Missouri at $40,000. It is the purpose of the company to increase its capital to $1,500,000. It is said by members of the company that the first machine will be on the market by the first of the year.

The model used here for demonstrating is a front wheel drive with brakes on all wheels. The test machine is a reconstructed Scripps-Booth weighing 2000 lb.

Whaley to Manage Columbus Tractor Show

COLUMBUS, July 31—Plans for the National Tractor Show which will be held in Columbus Feb. 7 to 12 under the auspices of the National Implement and Vehicle Manufacturers' Association in conjunction with the Columbus Tractor and Implement Club are fast being brought to a head. The local committee, consisting of W. J. Longbon, chairman; W. A. Hood, J. H. Choqwill, C. C. Gorsse and G. O. Thornburg, is now sending out contracts to prospective exhibitors. The show will be held on the Ohio State Fair Grounds, which are especially well adapted for the display and demonstrations.

The special committee of the National Implement and Vehicle Manufacturers' Association, which will co-operate with the Columbus club, will be in Columbus soon to arrange many of the details. This committee consists of E. J. Gittins, vice-president and general manager of the J. I. Case Co.; Judge Everson, general trade manager of the International Harvester Co., and President Brantingham of the Emerson-Brantingham Co.

The announcement is made that W. W. Whaley of Springfield, Ohio, has been made general manager of the show.

BLACK & DECKER PRICES FIRM

BALTIMORE, Aug. 2—The Black & Decker Mfg. Co., makers of portable electric drills, electric valve grinders and electric air compressors, has informed its jobbers that there will be no price reductions this year on their products and that starting Jan. 1 next, jobbers will be protected against price recessions for 60 days after they buy. The company explains that no lowering of costs is possible at present, but that if it does become possible in the future it will be made promptly and the company will absorb any loss resulting from its guarantee.

CHEVROLET SETS DIRT RECORD

COLUMBUS, Aug. 3—A new dirt track record of 89 minutes and 23 seconds for a hundred miles was hung up by Gaston Chevrolet in a Frontenac car in the three cornered race held here Sunday between the winner, Tommy Milton and Ralph Mulford. Milton was second four laps behind. Mulford broke a valve in the first lap and was forced to quit. The former record of 91 minutes was made by Tom Alley at Minneapolis in 1914. Chevrolet led at every lap.

Calendar

SHOWS

Aug. 9-14—Sedalia, Mo., Farm Implement and Tractor Show in conjunction with Missouri State Fair, Kansas City, Tractor Club.

Aug. 23-27—San Francisco, National Traffic Officers' Safety First Exposition, Auditorium, C. De Witt De Mar, Manager.

Aug. 25-Sept. 3—Des Moines, Annual Fall Automobile Show in connection with Iowa State Fair, C. G. Van Vliet, Mgr.

Aug. 28-Sept. 11—Toronto, Canada, National Automobile Show, Automotive Industries of Canada, in connection with Canadian National Exhibition, Exhibition City.

Aug. 30-Sept. 4—Milwaukee, Annual Automobile Show in conjunction with Wisconsin State Fair.

Sept. 6-11—Indianapolis, Twentieth Annual Fall Automobile Show in connection with Indiana State Fair.

Sept. 18-25—Cincinnati, Annual Automobile Show, Passenger cars only, Cincinnati Automobile Dealers' Ass'n. Music Hall Buildings.

Sept. 20-26—Los Angeles, National Tractor and Implement Show of the West, Tractor and Implement Dealers' Ass'n. of Southern California. Guy H. Hall, Mgr.

Sept. 27-Oct. 2—Buffalo, Closed Car Show, Buffalo Automotive Dealers' Ass'n, Elwood Music Hall, C. C. Proctor, Mgr.

Oct. 6-16—New York. Electrical Show. Grand Central Palace. George F. Parker, Manager.

Nov. 14-21—New York, Automobile Salon, Commodore Hotel Ballroom.

Nov. 15-20—Chicago, Automotive Equipment Show, Coliseum, Automotive Equipment Association.

Dec. 10-18—New York. Motor Boat Show. Grand Central Palace.

Jan. 8-15—New York. National Passenger Car Show, Grand Central Palace. Auspices of N.A.C.C.

Jan. 29-Feb. 4 — Chicago, National Passenger Car Show, Coliseum, Auspices of N.A.C.C.

Feb. 6-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.

FOREIGN SHOWS

Aug. 7-Sept. 15 — Motorcycles, sidecars, etc. Antwerp.

Sept. 4-25 — London, Machine Tool and Engineering Exhibition, Machine Tool Trade Ass'n, Inc., Olympia.

October—London. Commercial Vehicle Show, Olympia.

Nov. 4-13—London, International Motor Exhibition, Society Motor Mfr's and Traders, Ltd., Olympia and White City.

Nov. 29-Dec. 4—London, Cycle and Motorcycle Show, Cycle and Motorcycle Mfr's and Traders Union, Ltd., Olympia.

Jan. 7 — Sydney, Australian Motor Show.

CONTESTS

Aug. 7—Erie, Pa. Dirt track.

Aug. 14—Buffalo, N. Y. Dirt track.

Aug. 20-21—Middletown, N. Y. Dirt track.

Aug. 21—Elgine, Ill. Road race, Chicago Automobile Club.

Aug. 21—Johnstown City, Pa. Dirt track.

Aug. 28—Canandaigua, N. Y. Dirt track.

Aug. 27-8—Flemington, N. J. Dirt track.

Sept. 5 — Targa Florio Race, Sicily.

Sept. 6—Hornell, N. Y. Dirt track.

Sept. 6—Cincinnati, O. Speedway.

Sept. 6—Uniontown, Pa. Speedway.

Sept. 17-18—Syracuse, N. Y. Dirt track.

Sept. 25—Allentown, Pa. Dirt track.

Oct. 1-2—Trenton, N. J. Dirt track.

Oct. 8-9—Danbury, Conn. Dirt track.

CONVENTIONS

Aug. 10—Niagara Falls, Ont. Automotive Metal Wheel Ass'n. Clifton House. Standardization Discussions.

Sept. 16-17—Cleveland. Motor and Accessory Manufacturers' Ass'n. Credit Convention.

Oct. 11-13 — Chicago, National Association of Purchasing Agents' Annual Convention.

Jan. 11-13—S. A. E. Annual Meeting, New York City.

Stearns to Retire All Preferred Stock

CLEVELAND, Aug. 2—A meeting of stockholders of the F. B. Stearns Co. will be held here Sept. 1, to vote on the proposal of directors to increase the authorized outstanding common stock from 150,000 to 190,000 shares so that the present outstanding common stock may be doubled. Each shareholder will be given the right to purchase one new share for each now held at $5 per share.

Proceeds of the sale of this 93,816 shares of common stock will be used to retire the present outstanding preferred stock, thus leaving the company with only one stock, it having no bonds or other indebtedness.

At the first of the year the Stearns Co. had $417,400 of preferred stock outstanding. Since then, it is understood 8 per cent, or about $33,000, has been retired, leaving less than $390,000 outstanding. This accounts for the stock selling above par for the last several weeks.

Progress of the Stearns company the last year and a half has been rapid. As the management expects to maintain the present rate of dividend, which is $4 per share on the increased capitalization, consisting of 187,632 shares, this will be at the rate of 64 per cent on the old stock, which had a par value of $100.

Franklin Sales Total $17,238,936 to June 30

SYRACUSE, N. Y., Aug. 2—The H. H. Franklin Mfg. Co., manufacturers of the Franklin car, report for the six months period ending June 30, 1920, net sales of $17,238,936.21 and net profits after taxes of $1,849,203.25. Earnings for this six months period are equal to seventeen times dividend requirements on the outstanding preferred stock, and amount to the sum of $6.47 on each outstanding share of common stock. Net sales for the first six months of 1919 amounted to $8,950,290.14. The business done during the first six months of this year shows, therefore, a 92 per cent increase over the corresponding period of last year. The total net sales for the entire year of 1919 amounted to $23,466,522.43. It is interesting to note that the total net sales for the first six months of 1920 equal 73 per cent of the net sales for the entire year of 1919.

Small Creditors Vote to Continue Operations

INDIANAPOLIS, July 31 — A practical plan under which operations can be continued with every prospect of success was offered to the creditors of the William Small Co., manufacturer of Monroe cars, at a meeting held here to discuss the financial outlook. Approximately 150 creditors were present and they agreed unanimously to the adoption of the plan. The signatures obtained covered more than half the indebtedness of the company.

A creditors' committee of three will work with the present executives of the company and will have charge of all disbursements. It was deemed advisable to obtain the services of a high grade automobile production man to take charge of the factory.

The outlook was considered very hopeful and the creditors showed a strong disposition to do everything within reason to help the company out of its financial difficulties.

Willys Earnings Total $6,622,758 in 6 Months

NEW YORK, Aug. 2—Net profits of $6,622,758 for the six months ended June 30 were reported to the stockholders of the Willys-Overland Co. by John N. Willys in a statement he prepared before he sailed for Europe. This compared with $5,337,066 for the year ending Dec. 31 last. The total assets of the company are placed at $143,784,814, including current assets of $66,349,360 and advances of $19,380,818 to affiliated companies. The current liabilities are $35,983,074, with a reserve of $4,172,341 and a surplus of $26,151,982.

Discussing the future, Willys said in his report:

"Present conditions and the future outlook are satisfactory. The company's production has steadily increased since the first of the year and this increase has been accomplished at the same time that a substantial decrease has been made in the number of operatives employed. The company is having an extraordinary demand for its product for export. The domestic business continues upon a satisfactory basis.

"As a result of profit from operation and new financing recently consummated, the company is able to show an increase of approximately $14,000,000 in the balance of current assets over current liabilities, as compared with Dec. 31, 1919, figures."

TO MAKE NEW PISTON RING

EAU CLAIRE, WIS., Aug. 2—A new type of patented piston ring for high speed, heavy-duty gas engines will be manufactured by the P. R. Piston Ring Co., which has been incorporated at Eau Claire, Wis.